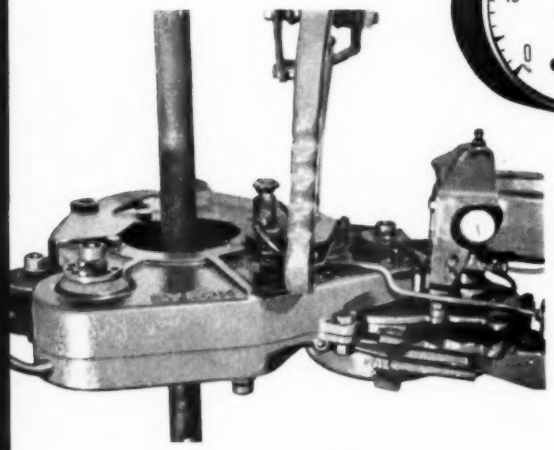
the OIL AND GAS JOURNAL

MEASURED MAKE-UP on every joint with this

BJ POWAIRMATIC TUBING TONG

makes short work of tubing jobs

BJ's Torque Indicator on the PowAIRmatic Tubing Tong *automatically* controls joint make-up on every tubing stand. It's an exclusive feature on the PowAIRmatic that safeguards against costly joint and collar leaks . . . reduces chance of galled, bottlenecked and crushed tubing . . . enables you to run tubing *faster* without costly guesswork!



But that's not the whole story! The PowAIRmatic Tubing Tong is a money-saver throughout your well-pulling operation . . .

It's more powerful – gives fast, positive make-and-break operation . . . makes short work of tubing jobs . . .

It's fast – requires no manual positioning, swings on and off the pipe instantly, spins-up at 60 rpm . . .

It's versatile – spring-locked roll-over hanger provides instant reversal for testing, backing off.

The BJ PowAIRmatic is the ideal cost-cutting tool for *all* your work-over jobs. Interchangeable jaws and bushings handle tubing and drill pipe from 1¼" through 3½" O.D., and are installed for different pipe sizes by removing a single pin. Husky, full-length dies provide maximum gripping area. Two-speed sealed-in-oil transmission and chain drive deliver full, efficient power. The PowAIRmatic is available with or without air compressor . . . *Ask the BJ representative nearest you for a demonstration—today—and write for bulletin giving full details.*

Simple adjustment of a pop-off valve accurately controls make-up for any size tubing. Once the valve is adjusted by the operator (from air pressure vs. torque data contained near the indicator dial) the PowAIRmatic delivers the exact torque required for proper tubing make-up. Indicator dial permits quick readings of torque make-up on each joint.

BJ MEANS ENGINEERED OIL TOOLS

Byron Jackson Co.

Since 1872

P. O. Box 2017, Terminal Annex, Los Angeles 54, Calif.

Offices in Principal Cities

PRICE 50 CENTS

TABLE OF CONTENTS PAGE 107

FEBRUARY 23, 1950

U-30

ONE portable drilling unit for deepest well drilling

PORTABLE

SAFE

RUGGED

DEPENDABLE

ECONOMICAL

Moving day is a comparatively light chore when you use the U-30. That's why, in one year's time, UNIT RIG'S Big U-30 is making such a hit with drillers. The U-30, like all UNIT RIG equipment, is a compact unit, enclosed in a heavy steel plate case, and can be transported to location ON ONE TRUCK.

Investigate the U-30 for all deepest well drilling jobs. The performance of the U-30 in actual drilling operations has actually amazed even the most critical and particular drillers hardened by years of operating many types of equipment.

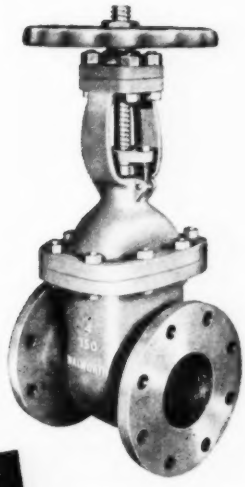
Get the Facts . . . Write for U-30 Bulletin

UNIT RIG & EQUIPMENT CO.
TULSA, OKLAHOMA U.S.A.

DESIGNED FOR THE JOB . . .

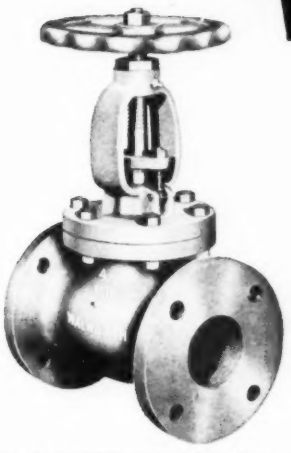
Exclusive Export Representative
MID-CONTINENT SUPPLY CO.
42 Broadway, New York City
Cable Address MIDUNITRIG

Newly Designed Walworth Valves to combat corrosion



Walworth 150-pound Stainless Steel Gate Valve . . . available in sizes ½ to 3-inch, screwed; ½ to 12-inch, flanged.

Made of Stainless Steel
Monel · Nickel
Acid-resisting Bronze
Ni-resist



Walworth 150-pound Stainless Steel Globe Valve . . . available in sizes ½ to 3-inch, screwed; ½ to 6-inch, flanged.

— ENGINEERED AND TESTED FOR TOUGH . . . HARD SERVICE

Walworth offers a comprehensive line of valves made of several cast stainless steels and special alloys for piping services where corrosion is a factor. These valves are available in Gate, Globe, Angle, Check, and Lubricated Plug types.

Gate, Globe and Angle Valves have outside screw and yoke construction, thus keeping the stem threads out of contact with the corrosive material in the line. They also have a two-piece bolted gland with ball-type gland follower to prevent binding the stem when packing bolts are tightened. Gland eye-bolts can be conveniently swung out of the way without danger of loss when the gland is lifted for repacking.

Gate Valves have taper seats with a unit consisting of two flat faced discs supported by a carrier on the end of the stem. The discs are of a proven ball-and-socket type. They are free to rotate and adjust themselves to the body seat angles, assuring tight seating with no possibility of sticking in any position.

For further information about Walworth's full line of corrosion-resistant valves, see your Walworth distributor.

Sectional view of Walworth 300-pound Stainless Steel Gate Valve . . . available in sizes 2 to 6-inch, flanged.

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910. at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1950.

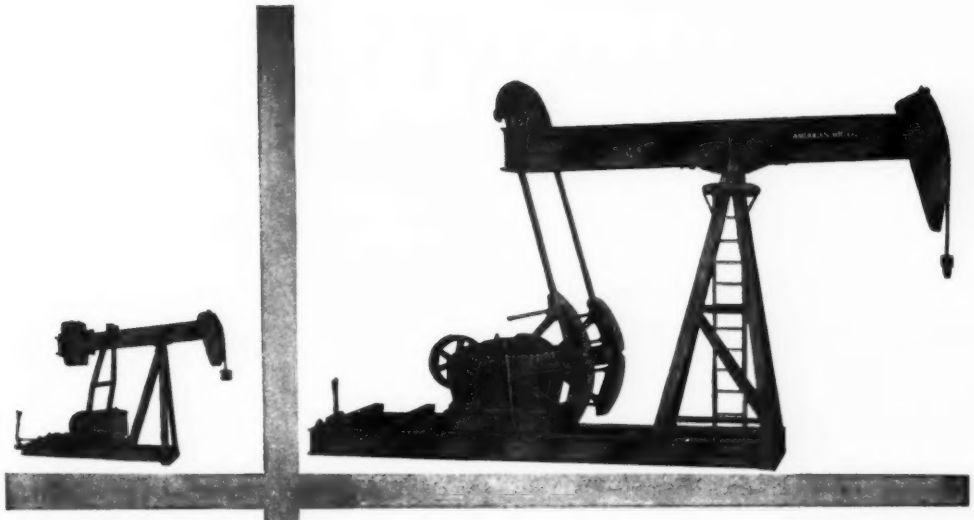
Rugged

Fairbanks-Morse 8 cover side pot fluid end power pumps are rugged . . . built for lasting service. Add to this, the self-oiling power end and maximum accessibility for inspection and servicing, and it's easy to see why these power pumps are so widely preferred in the field. Pumps are readily adaptable for pumping water, slush, or petroleum products. Fairbanks, Morse & Co., Chicago 5, Ill.

FAIRBANKS-MORSE

A name worth remembering

OIL FIELD EQUIPMENT • DIESEL LOCOMOTIVES • DIESEL ENGINES • PUMPS
SCALES • MOTORS • GENERATORS • STOKERS • RAILROAD MOTOR CARS
and STANDPIPES • FARM EQUIPMENT • MAGNETOS



from the husky little T-5 ... *to the big powerful T-27*

AMERICAN Units

... reduce pumping costs

Whether the job is large, small, or in-between, there is an American Pumping Unit the right size to give longer service with less servicing. Various combinations of structures and reducers make available a wide range of Units from which the most economical application can be selected.

American Units are designed to A.P.I. standards. Specify American ... proven by 25 years of service to the oil industry.

Contact your favorite supply store or the nearest American office NOW

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AMERICAN MANUFACTURING COMPANY OF TEXAS

FORT WORTH, TEXAS PHONE 8-2301

POWELL VALVES have *these* "ABILITIES" to a high degree:

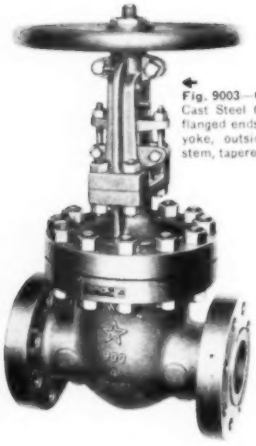


Fig. 9003—Class 900-pound Cast Steel Gate Valve with flanged ends, bolted flanged yoke, outside screw rising stem, tapered solid wedge.

ADAPTABILITY. The Powell Line is so complete* that there's a Powell Valve especially adapted, in design and material, to meet the requirements of each and every industrial flow control service.

DURABILITY. Powell Valves are noted for their durability. That is because each Powell Valve is built to stand up under the specific flow control conditions to which it may be subjected.

DEPENDABILITY. Every Powell Valve is specifically designed to give dependable, uninterrupted service over a long period of time. That is why Powell Valves reduce costly "down time" for maintenance to a minimum.

Fig. 1793 — Large 125-pound Iron Body Bronze Mounted Gate Valve. Made in sizes 2" to 30", inclusive. Has outside screw rising stem, bolted flanged yoke and tapered solid wedge.

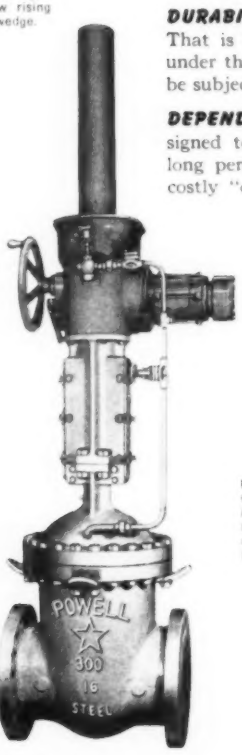


Fig. 3023—Class 300-pound Cast Alloy Steel Gate Valve with automatic steam sealing mechanism. Has explosion proof electric motor operator.

Fig. 375 — 200-pound Bronze Gate Valve with screwed ends, inside screw rising stem, union bonnet and renewable, wear-resisting "Powellium" nickel-bronze disc.

Fig. 3061—Class 300-pound Cast Steel Swing Check Valve with flanged ends and bolted cap. Disc has ample lift to permit full, straightway, unobstructed flow through the valve body.

***The Complete Powell Line includes Globe, Angle, "Y", Gate, Check, Non-return, Relief and Flush Bottom Tank Valves in Bronze, Iron, Steel and a wide range of Corrosion-resistant metals and alloys.**

Ask your nearest Distributor or write direct

The Wm. Powell Company
Cincinnati 22, Ohio
DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

POWELL VALVES

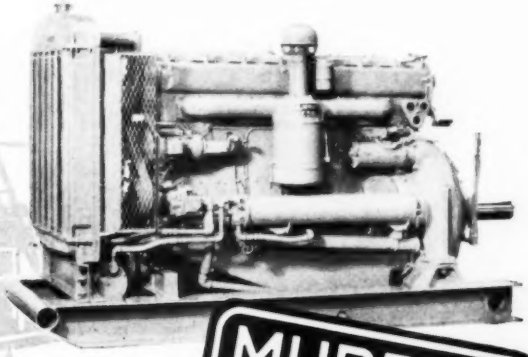
Come out of the hole faster

with

MURPHY DIESEL POWER

THE faster you can get a string of pipe out of the hole, the more time you'll have for making hole. That's how the Murphy Diesel's *immediate responsiveness* and ability to hang on to a load pays off. With a hydraulic servo-type governor in combination with "true" diesel operation and unit fuel injection, the Murphy Diesel takes hold of a load immediately and doesn't let go. This is the kind of performance that lets you make more hole per day and more hole per dollar of power cost.

Don't take our word for it, though. Check with Murphy Diesel owners in your locality and let them tell you about their experience. That's the real proof. In the meantime, ask your Murphy Diesel Dealer to give you full details on design, sizes, etc. or write direct.



MURPHY DIESEL

MURPHY DIESEL COMPANY
5305 West Burnham St., Milwaukee 14, Wisconsin
OIL INDUSTRY FACTORY BRANCH—*Sales, Parts and Service:*
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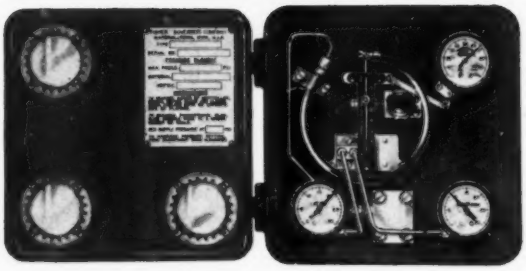
Heavy duty power
for the oilfields

Murphy Diesel Engines and Power Units for drilling and pipe line pumping, 90 to 220 H.P. Diesel Electric Generator Sets 60 to 133 K.W.

Your Favorite Dependable WIZARD...in a new gas-tight weather-proof case for flush or surface panel mounting



Type 4100U remote mounting Wizard with cover open.

FISHER WIZARD PILOT

SERIES 4100U

Side view Type 4100U for flush mounting.

Side view Type 4100U for surface mounting

Universal case adapts Wizard to flush or surface panel mounting and also to valve yoke mounting.

Available with either bellows or Bourdon tube measuring element, for pressures from inches W. C. to 10,000 PSI.

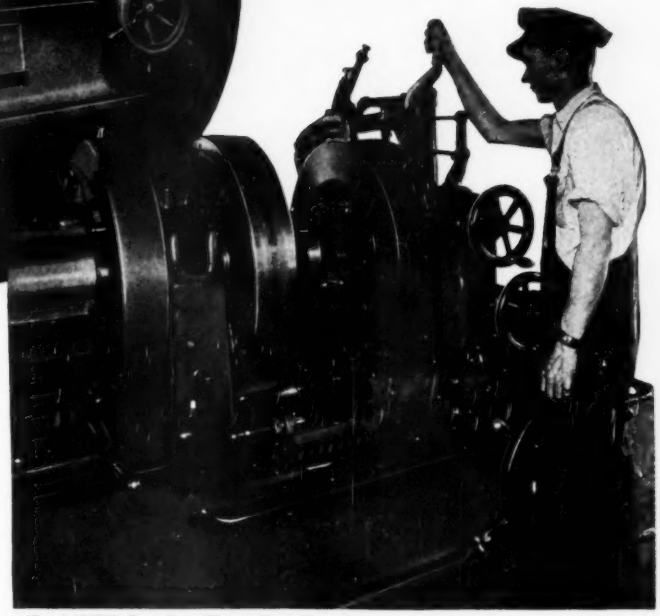
Simple knob adjustment for controlled pressure setting, indicated on calibrated dial.

WRITE TODAY FOR BULLETIN D4

FISHER GOVERNOR CO.
MARSHALLTOWN, IOWA

Multiple Tool Chasing
REDUCES THREADING TIME

The LANDIS Receding Chaser Pipe Threading and Cutting Off Machine fitted with the Receding Chaser Pipe Die Head is shown in production on oil well casing. The use of six tangential pipe chasers to generate the thread reduces threading time to a minimum.



IN selecting a Pipe Threading Machine for the production of threads on casing, tubing, and drill pipe, the basic considerations of low cost production must not be overlooked. The narrow chasers used in the Receding Heads of LANDIS Pipe Threading and Cutting Machines will lower tool cost 75% and require less horsepower for the threading operation.

A LANDIS 8⅝" Pipe Machine completes an 8 pitch, ¾" taper, 4⅝" long thread on 8⅝" drill pipe in 3.03 minutes. Only a few seconds is needed to ream the drill pipe—the cutting off and beveling operation is limited to 5 minutes.

● The LANDIS Receding Chaser Pipe Threading and Cutting Machine has many other features which contribute to the production of threads well within A.P.I. tolerances—yet make possible low cost production.

Write for Bulletin C-77

***The* LANDIS CHASER**

The Finest Thread Cutting Tool in Industry

LANDIS MACHINE *Company*
WAYNESBORO, PA., U.S.A.

THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS

Represented in the Domestic Oil Fields by: Colcord-Wright Machinery & Supply Co., St. Louis, Mo.; C. J. Harter Machinery, Houston, Texas; Frederic-Baker Co., New Orleans, La.; Moore Machinery Co., Los Angeles and San Francisco, Calif.; Hendrie & Bolthoff Mfg. & Supply Co., Denver, Colo.

New "HEAVY-DUTY" 2½-TON GMC TRUCKS

Designed to Allow Operators in the 2½-Ton Range to Haul Bigger Loads at Less Cost

More Powerful 270-cu.-in. "Army Workhorse" Engine

•

Heavy Duty Rear Axle

•

Five-Speed Direct and Optional Overdrive Transmissions

•

New Heavy Duty Hydraulic and Optional Air Brakes

•

Conventional and Cab-Over-Engine Models

•

Six Wheelbases Providing Nine Cab-to-Axle Dimensions

Here's real "big" truck performance in the middle duty hauling range . . . here are GMC's new 470 models . . . trucks for over-the-road and off-the-highway operators that set new standards in 2½-ton hauling ability.

These GMCs are all truck-built from exclusive bumper-bar grille to tough, rugged rear axle . . . offered in single, double reduction or 2-speed types. They have big GMC valve-in-head engines and are available with air brakes . . . features that make them highly desirable for both truck and tractor use.

GMC 470s, in ten models, are built to provide an extra margin of performance . . . to haul bigger loads at less cost in the petroleum transport field.

GMC
GASOLINE • DIESEL
TRUCKS

GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

Here's why you'll like

ORTAC

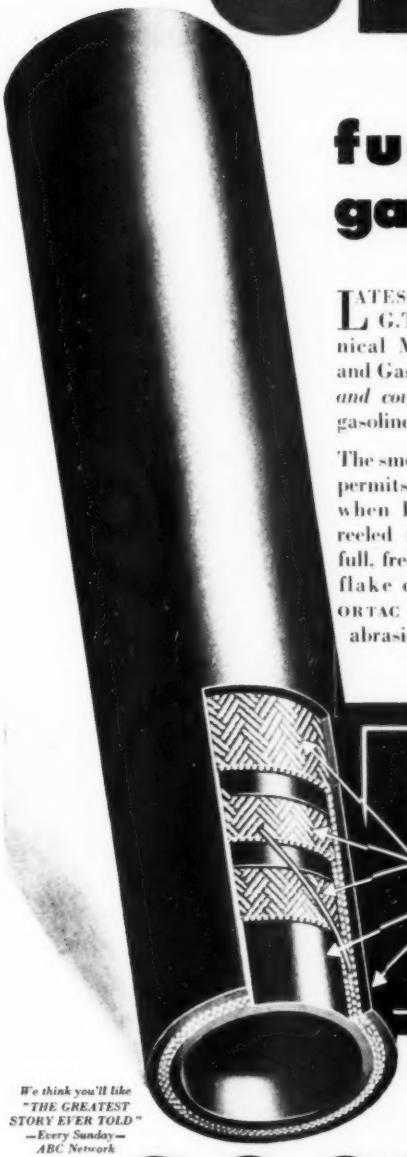
(oil-resistant tube and cover)

fuel oil and gasoline hose

LATEST development of the G.T.M.—Goodyear Technical Man—ORTAC Fuel Oil and Gasoline Hose has *both tube and cover that resist attack* by gasolines, fuel oil and distillate.

The smooth-bore synthetic tube permits faster discharge. Even when half to three-quarters reeled up, ORTAC will deliver full, free flow. It won't swell or flake off. And the cover of ORTAC resists weather, sun and abrasion just as it does oil.

ORTAC hose is reinforced with braids of high-strength rayon cord—for flexibility and kink-resistance as well as strength. Because it is made in long, continuous lengths, you can get just the amount you need. The copper wire in the second braid is "accident insurance" because it dissipates static electrical charges. Ask the G.T.M. for full details about ORTAC Fuel Oil and Gasoline Hose—or write Goodyear, Akron 16, Ohio.



GOODYEAR INDUSTRIAL RUBBER PRODUCTS

GTM-Specified ORTAC FUEL OIL AND GASOLINE HOSE

for handling oils, gasolines and distillate

A. Braids of high-strength rayon cord; copper anti-static wire incorporated in second braid.

B. Synthetic tube resists oils and gasoline.

C. Synthetic cover resists weather, oil, sun, abrasion.

ORTAC (oil-resistant tube and cover) hose is available in 1", 1¼", and 1½ x 3" braid sizes in long, continuous lengths. Fitted with one-time couplings.

We think you'll like "THE GREATEST STORY EVER TOLD" —Every Sunday— ABC Network

FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING *built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor.*

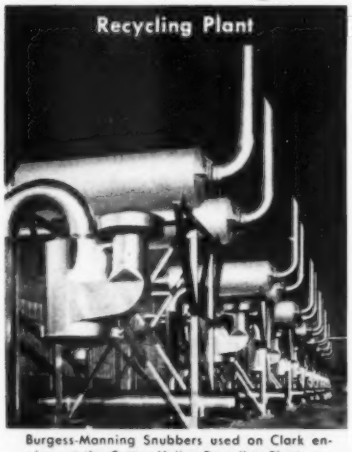
GOODYEAR

THE GREATEST NAME IN RUBBER

Ortac—T.M. The Goodyear Tire & Rubber Company

In the Petroleum Industry

Look to BURGESS-MANNING
Leader in Engine and Compressor Noise Reduction



Burgess-Manning Snubbers used on Clark engines at the Cotton Valley Recycling Plant.

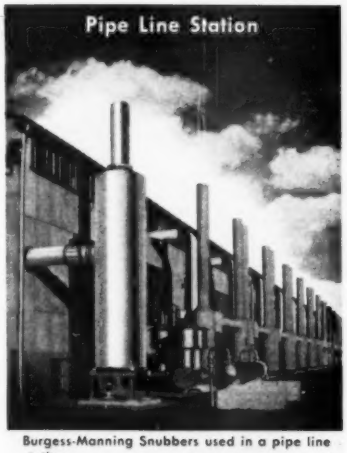
Burgess-Manning Snubbers on 180-hp gas engines used by a Kansas plant.

Almost twenty-five years' experience in the design and application of Snubbers has given Burgess-Manning the know-how to help solve your engine and compressor noise reduction problems.

Burgess-Manning Snubbers smooth the flow of exhaust gas or intake air without restricting gas flow. Exhaust or intake pulses of gas are effectively snubbed so that the oscillating flow of gas is smoothed to a unidirectional flow.

If you are installing engines or compressors, let Burgess-Manning submit Snubber recommendations. Long experience guarantees complete satisfaction.

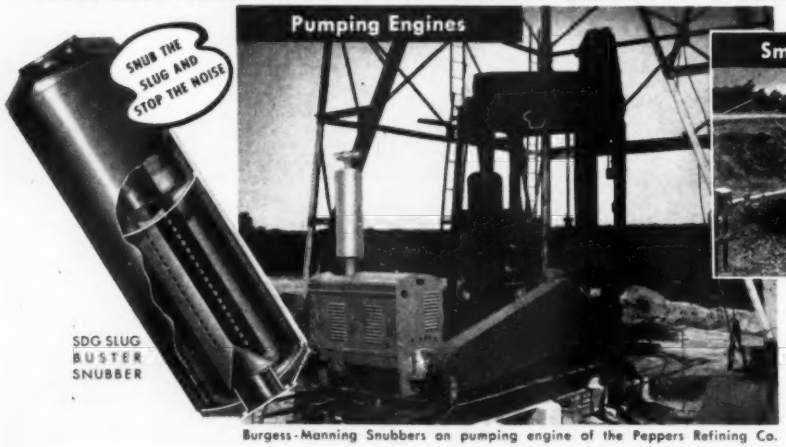
BURGESS-MANNING COMPANY
LIBERTYVILLE, ILLINOIS



Burgess-Manning Snubbers used in a pipe line station.

Burgess-Manning Snubbers used on engines of a pressure maintenance plant.

FROM WELL HEAD THROUGH THE REFINERY GATE . . . IT'S BURGESS-MANNING



Burgess-Manning Snubbers on pumping engine of the Peppers Refining Co.

Burgess-Manning Snubber installed on pipe line engine of the Magnolia Pipe Line Company.

HERE'S MOTOR REPAIR SERVICE

THAT WILL SAVE YOU MONEY!

A-C Certified Service Shops, like Cincinnati Electric Equipment Company shown, have modern equipment and expert personnel for fast emergency service . . . for routine maintenance and repair that keeps your production rolling smoothly.

WHEREVER YOU ARE, there is a nearby Allis-Chalmers Certified Service Shop to keep your motors and other electrical equipment running smoothly. These independent shops are selected after careful investigation for their up-to-date equipment, experienced personnel, good business practices and will to serve. They use only factory-approved parts and methods.

When you need repairs or maintenance on motors and other electrical equipment, depend on Allis-Chalmers Certified Service. Write for a list of the Certified Service Shops near you.

For New Motors and Control . . .

No one knows more about correct motor and starter application than your A-C Certified Service Shop. When you need new motors or starters, check with the one in your area or with your nearest A-C Sales Office.

ALLIS-CHALMERS, 1059A SO. 70 ST. A-2935
MILWAUKEE, WIS.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

"CATERPILLAR" MOTOR GRADERS

Every "Cat" Diesel Motor Grader is "Caterpillar"-built *through and through*—from front wheels to rear—from complete engine to final drive. All mechanical parts are designed and fitted together for matched performance, correct balance, proper weight distribution and long life. "Caterpillar" design, engineering and construction are all aimed at helping you get the utmost out of your motor grader investment. The records prove it . . . 99% of all "Caterpillar" Motor Graders ever built are *still on the job!*

Your "Caterpillar" dealer can give you plenty of additional facts and figures. Meantime, send the coupon today.

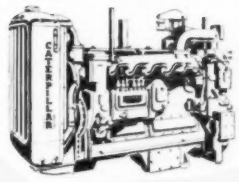
Caterpillar Tractor Co., Peoria, Illinois

This "Caterpillar" Diesel No. 12 Motor Grader is building an access road to a drill site near Santa Maria, California. The "Cat" No. 12 is a profitable tool for many other oilfield jobs, such as leveling drill sites and digging slush pits. High production and precision blading call for the balanced design and matched performance of an all-"Caterpillar" Motor Grader.

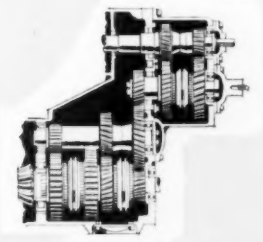
•

Standard "Caterpillar" Diesel Motor Graders are priced as follows: No. 12, $10,920; No. 112, $9545; No. 212, $6435, all prices f.o.b. Peoria, Illinois, subject to change without notice.

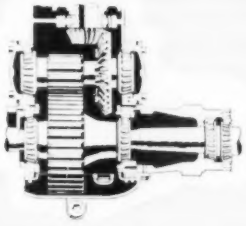
ARE BUILT—NOT "ASSEMBLED"



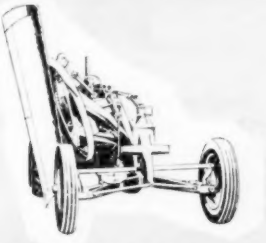
ENGINE. The dependable, heavy-duty all-"Caterpillar"-built No. 12 Motor Grader engine is designed to function as a unit with all other parts of the machine. It has ample speed and power plus ruggedness to stand up on the job. Solid aluminum alloy main and connecting rod bearings are important reasons why these engines are so long-lived.



TRANSMISSION. The "Caterpillar" No. 12 Motor Grader transmission is a *constant-mesh helical gear transmission* specially designed and fitted to heavy-duty motor grader use. Yet it shifts with "pleasure car" ease. Typical of "Caterpillar" quality is the independent gear-type lubricating oil pump which keeps every transmission gear bathed in a full supply of filtered oil.



FINAL DRIVE. Heavy-duty engine and transmission require a rugged but simple final drive system to keep the motor grader at top working efficiency. Engine horsepower is converted into maximum tractive effort and earthmoving volume through this simple, sturdy system. Tapered roller bearings throughout keep friction losses at a minimum.



BLADE MECHANISM. The "Caterpillar" Motor Grader frame and blade system fully matches the sturdy in-built quality of the "Cat" Diesel Engine, transmission and final drive. Blade working positions like the one shown here can be made by the operator without leaving his position at the wheel. Mechanical-powered controls are unaffected by temperature changes.

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES

TRACTORS

MOTOR GRADERS

EARTHMOVING EQUIPMENT

CATERPILLAR TRACTOR CO., Box OG-2, Peoria, Illinois

Please send me a copy of your informative booklet, "'Cat' Motor Graders Do the Job."

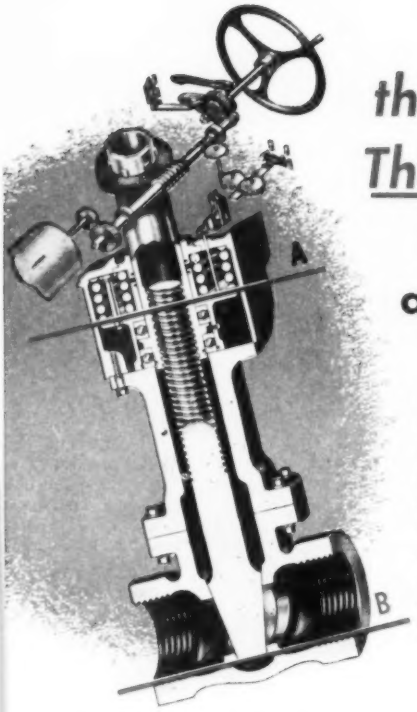
Signed _____

Address _____

Cutler-Hammer TNY

the Valve Operator with Thrust Controlled Seating

that assures absolutely safe, accurate and consistent seating

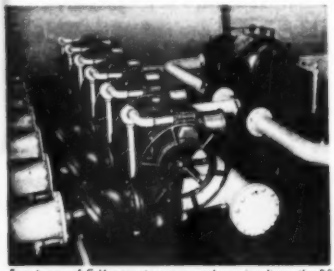


The principle of the unique Thrust Controlled Seating of C-H TNY operators

During seating movement, Fulcrum is at A (above) and drive is down, toward the valve seat. At moment of tight seating, Fulcrum *transfers* to B (below) and further drive is upward, against the springs, which trip the *THRUST* switch and absorb the drift energy of the motor.

As every practical operating man knows, the problem of *mechanized* valve operation is the problem of seating the valve to the required degree of tightness without undue strain upon any of the valve parts —in the face of conditions that vary widely not only from installation to installation but from time to time on the same valve.

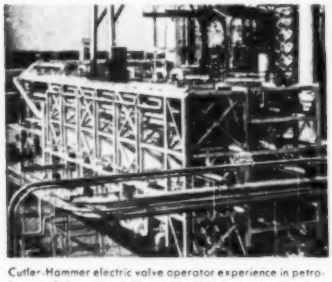
There is one system of valve operation that *does* seat valves accurately, safely, without need of manual seating or back-off, without danger of jamming . . . the Cutler-Hammer TNY Valve Operator with *THRUST* controlled seating. With this unique feature, the motor *positively* drives the valve disc home. During the driving period, the "fulcrum" is established at the yoke nut by heavy steel springs which exactly balance *tight seat pressure*. Therefore, *at the exact instant of desired tight seating, the driving fulcrum transfers to the seat of the valve*, hence any further drive is into the heavy springs themselves which trip the *THRUST* switch and harmlessly absorb motor drift. The amazing thing is, the same degree of tight seating is maintained as valve parts expand and contract. No other valve operator has this direct *THRUST* controlled feature. No other valve operator can be as safe and sure and accurate. You can get C-H TNY as standard equipment on all leading makes of valves. CUTLER-HAMMER, Inc., 1453 St. Paul Ave., Milwaukee 1, Wis.



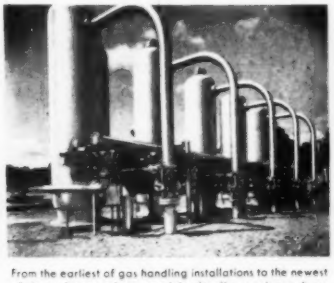
Two types of C-H operators are used on pipe lines, the B2 **with automatic declutching** on Plug Valves, for instantaneous stop, and the TNY on Gate Valves for **thrust** seating.

Best by test through many years for every petroleum industry need

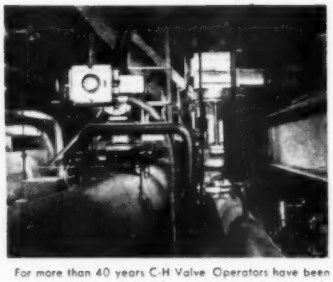
CUTLER-HAMMER
VALVE CONTROL
C-H



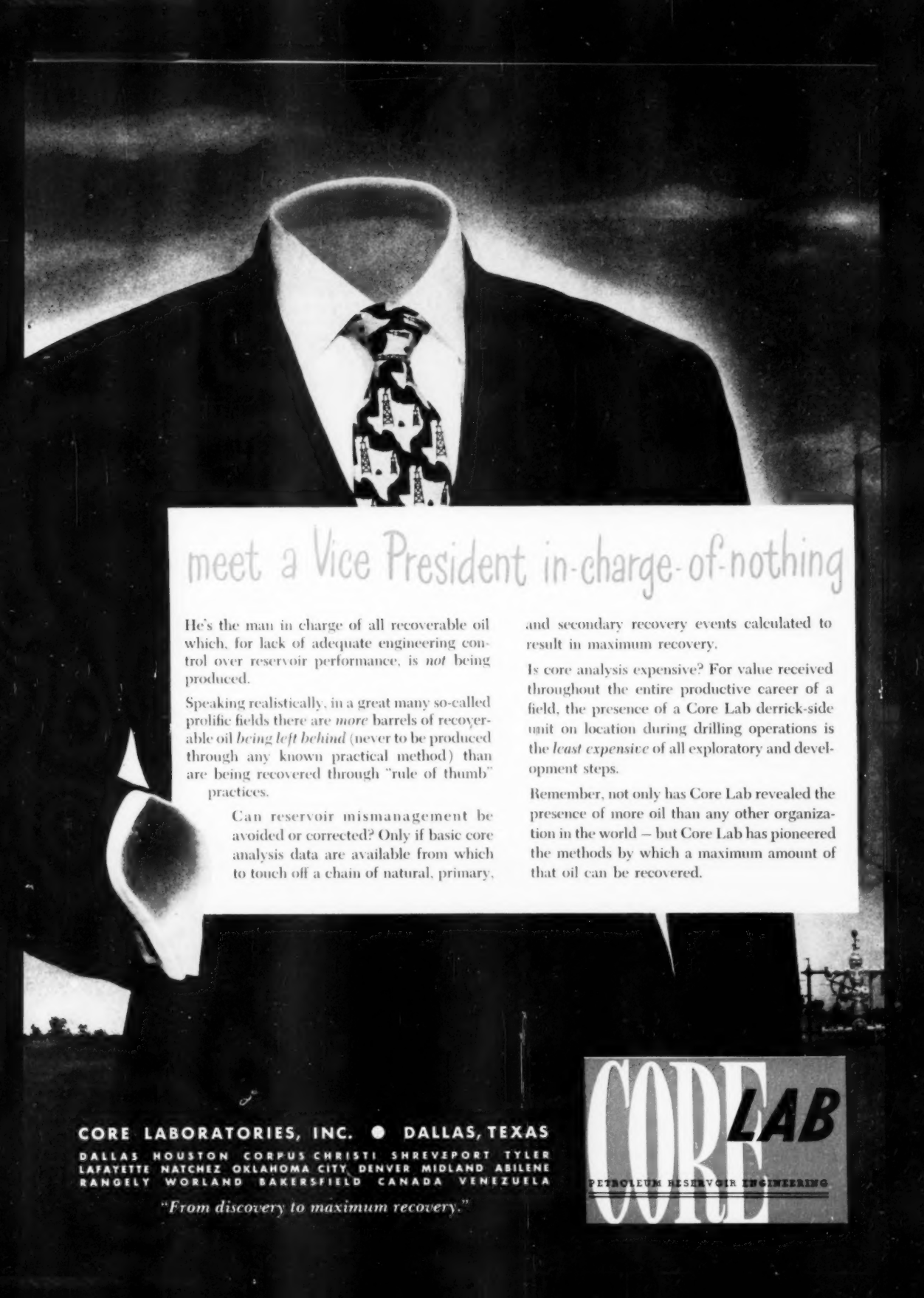
Cutler-Hammer electric valve operator experience in petroleum refining spans the entire decade since advanced processes brought the first units into use.



From the earliest of gas handling installations to the newest of the underground storage jobs, leading engineers have selected C-H Electric Valve Operators.



For more than 40 years C-H Valve Operators have been the overwhelming choice of power plant and waterworks engineers.



meet a Vice President in-charge-of-nothing

He's the man in charge of all recoverable oil which, for lack of adequate engineering control over reservoir performance, is *not* being produced.

Speaking realistically, in a great many so-called prolific fields there are *more* barrels of recoverable oil *being left behind* (never to be produced through any known practical method) than are being recovered through "rule of thumb" practices.

Can reservoir mismanagement be avoided or corrected? Only if basic core analysis data are available from which to touch off a chain of natural, primary, and secondary recovery events calculated to result in maximum recovery.

Is core analysis expensive? For value received throughout the entire productive career of a field, the presence of a Core Lab derrick-side unit on location during drilling operations is the *least expensive* of all exploratory and development steps.

Remember, not only has Core Lab revealed the presence of more oil than any other organization in the world – but Core Lab has pioneered the methods by which a maximum amount of that oil can be recovered.

CORE LABORATORIES, INC. ● DALLAS, TEXAS

DALLAS HOUSTON CORPUS CHRISTI SHREVEPORT TYLER
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"From discovery to maximum recovery."

CORE LAB

PETROLEUM RESERVOIR ENGINEERING

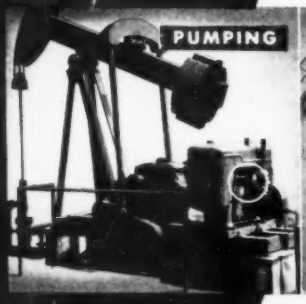
when time is money!

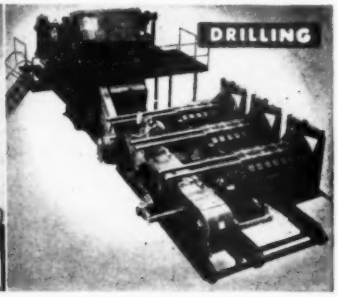
Drillers and production men look to

ENSIGN CARBURETION

for DEPENDABLE low cost

GAS ENGINE PERFORMANCE





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CARBURETOR COMPANY
Dealers and Distributors in All Principal Oil Fields

7010 SO. ALAMEDA ST., P.O. BOX 229, HUNTINGTON PARK, CALIF. • BRANCH FACTORY: 2330 W. 58TH ST., CHICAGO 36, ILLINOIS

Top-of-column photograph of the atmospheric stage of an 18,000 bbl/day two-stage crude distillation unit designed and constructed by Foster Wheeler for the Pure Oil Company at the Smithsbluff, Texas refinery.

five products

3 gaps

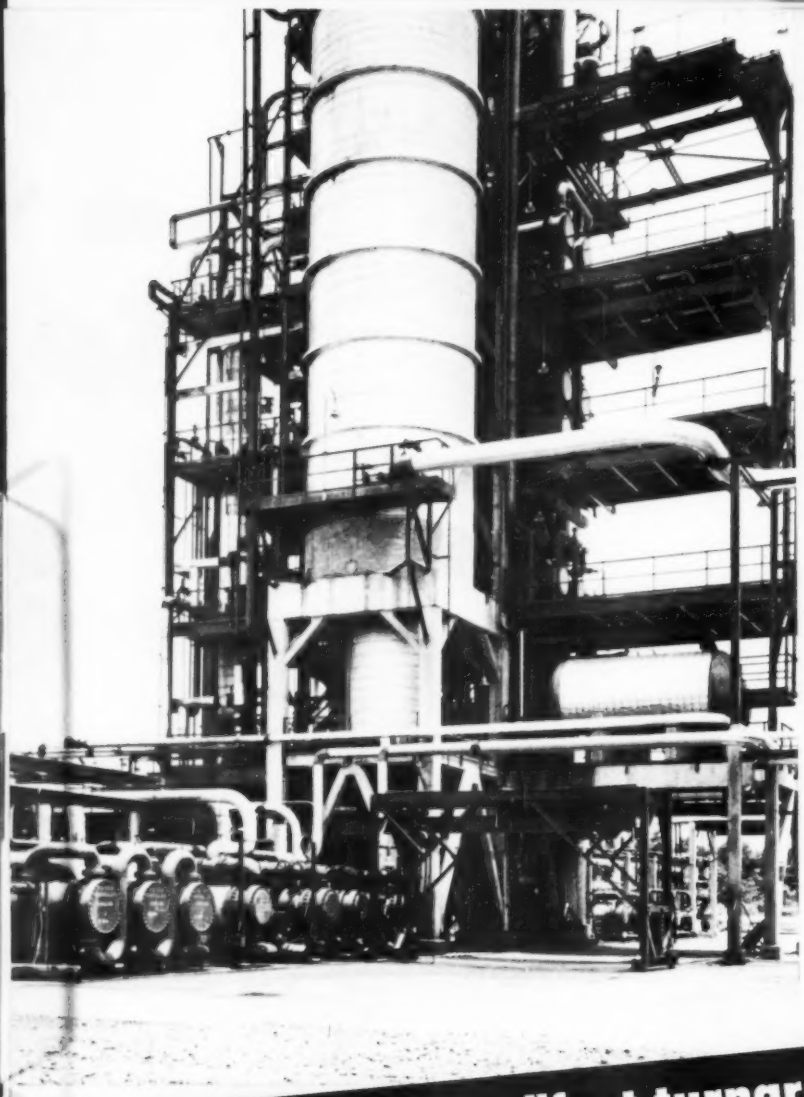
one fraction
no gap — no overlap

Cut	IBP	FBP	Gap
Top	—	248	
			6
2	254	312	
			—
3	312	382	
			12
4	394	532	
			18
5	550	664	

Degrees F

FOSTER WHEELER CORPORATION

165 BROADWAY, NEW YORK 6, NEW YORK



designed for "fast turnaround"

Traveling crane available for removal of any exchanger in the ground level exchanger bank . . . also . . . movable cranes on three roomy column platforms for servicing condensers.

These and other "shutdown features", designed into this crude unit, maintain process equipment at maximum efficiency and contribute effectively to a "fast turnaround" and a high overall operating economy.

FOSTER WHEELER CORPORATION

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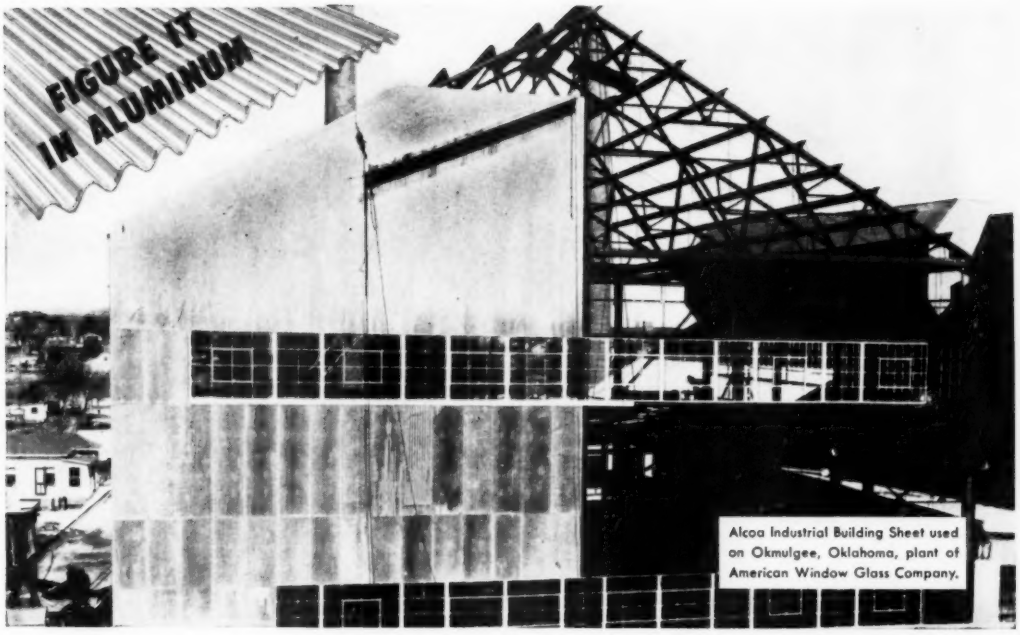

Alcoa Industrial Building Sheet used on Okmulgee, Oklahoma, plant of American Window Glass Company.

FOR SIDING THAT GOES UP FAST

Alcoa Industrial Building Sheet is light— easy to handle — slashes erection costs

You can figure on new records for fast, low-cost construction when you figure your next job in Alcoa Industrial Building Sheet. Light, strong, easily handled and applied, it helps you slash costs; keep ahead of schedules.

Proved by records of over 25 years of maintenance-free service, Alcoa Industrial Building Sheet stands up under most corrosive industrial smoke and fumes; can't rust away; never needs painting. Construction workers like to handle light, strong Alcoa Industrial Sheet—can put up more in a day.

Conveniently available with all types of fasteners and accessories. For application and engineering details call your nearby Alcoa Sales Office, listed under "Aluminum" in your Classified Telephone Directory, or mail the coupon.

FACTS FOR CONTRACTORS AND ENGINEERS

Alcoa Industrial Building Sheet may be erected over steel or wood perlins or girts. It may be fastened by nails, purlin nails, straps, clips, screws or weldable studs.

Lengths: 5 to 12 feet. Widths: Roofing, 35 inches; Siding, 33¾ inches; Thickness: .032 inches — equal to 21 U. S. Gauge.

Available for prompt shipment with all types of fasteners and flat and preformed flashing.

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Please send me engineering and application data on Alcoa Industrial Building Sheet.

Name

Company

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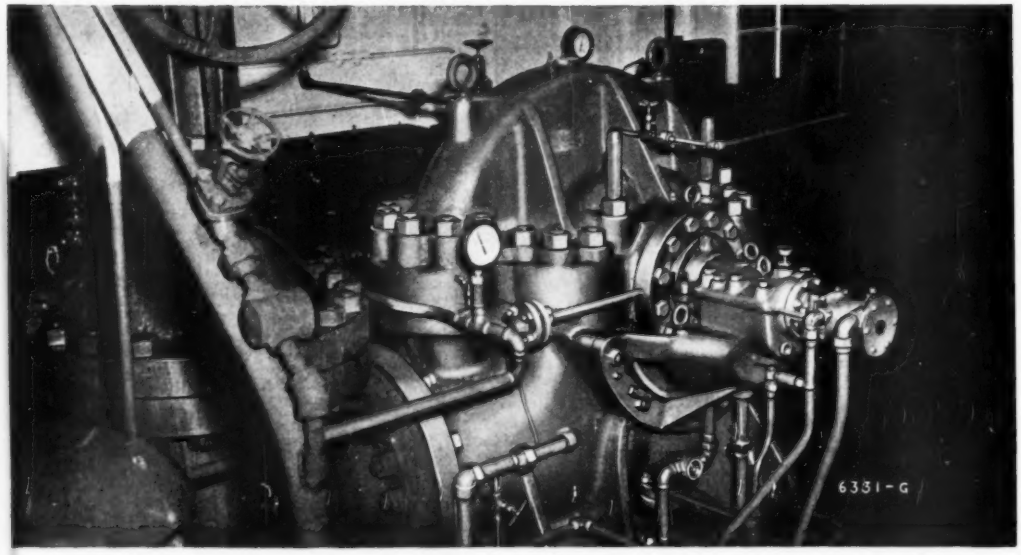
INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

PRESSURES AT 1000 PSI

NOW PRACTICAL WITH CENTRIFUGAL COMPRESSORS



One of the new De Laval high pressure centrifugal compressors now pumping gas through the Big and Little Inch pipelines.

The inherent advantages of the centrifugal compressor—*output flexibility, compactness, simplicity* and *high capacity*—are no longer limited to relatively low pressure service.

The development of a highly satisfactory shaft seal, coupled with other improvements in design, enables us to furnish centrifugal compressors for operation at pressures approaching 1,000 psi. These machines have given thousands of hours of continuous, trouble-free service. No mechanical failures have been experienced, gas leakage past the shaft seal has been nil and efficiency guarantees have been met.

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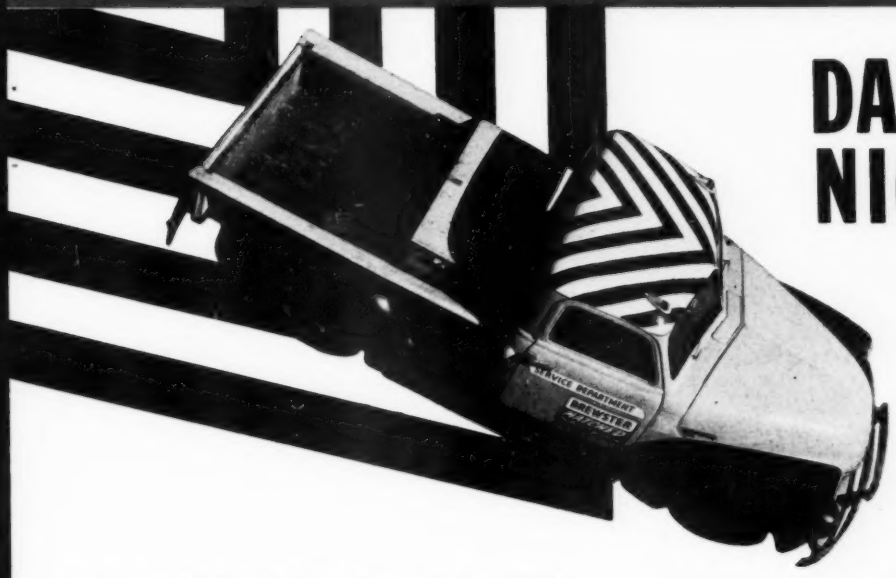
DE LAVAL

DE LAVAL STEAM TURBINE COMPANY, TRENTON 2, N. J.

TURBINES • HELICAL GEARS • CENTRIFUGAL BLOWERS AND COMPRESSORS
CENTRIFUGAL PUMPS • WORM GEAR SPEED REDUCERS • IMO OIL PUMPS

C-12

SERVICE STRIPES... TO REMEMBER



DAY or NIGHT

You can recognize Brewster Service Department trucks on sight, by the prominent black lines on the top of every cab. These are Service Stripes—for they show that a trained experienced Brewster Service Man is on the job, or on his way, to service and repair Brewster rigs anywhere in the U. S., or any make drilling rig in the Mid-Continent Area. Night or day, Brewster Service Men are prepared to leave for your location by truck—or by air if necessary. When your operations are threatened with delay because of breakdowns, or the need for replacement parts, call the Brewster Service Department for fast, expert service and repair. Write today for your copy of the folder describing the facilities of the Brewster Service Department.

The BREWSTER COMPANY, INC.

SHREVEPORT, LOUISIANA

SERVICE DEPARTMENT

BREWSTER
MATCHED
Drilling Equipment

TEAR OUT the Card below and KEEP IT HANDY!

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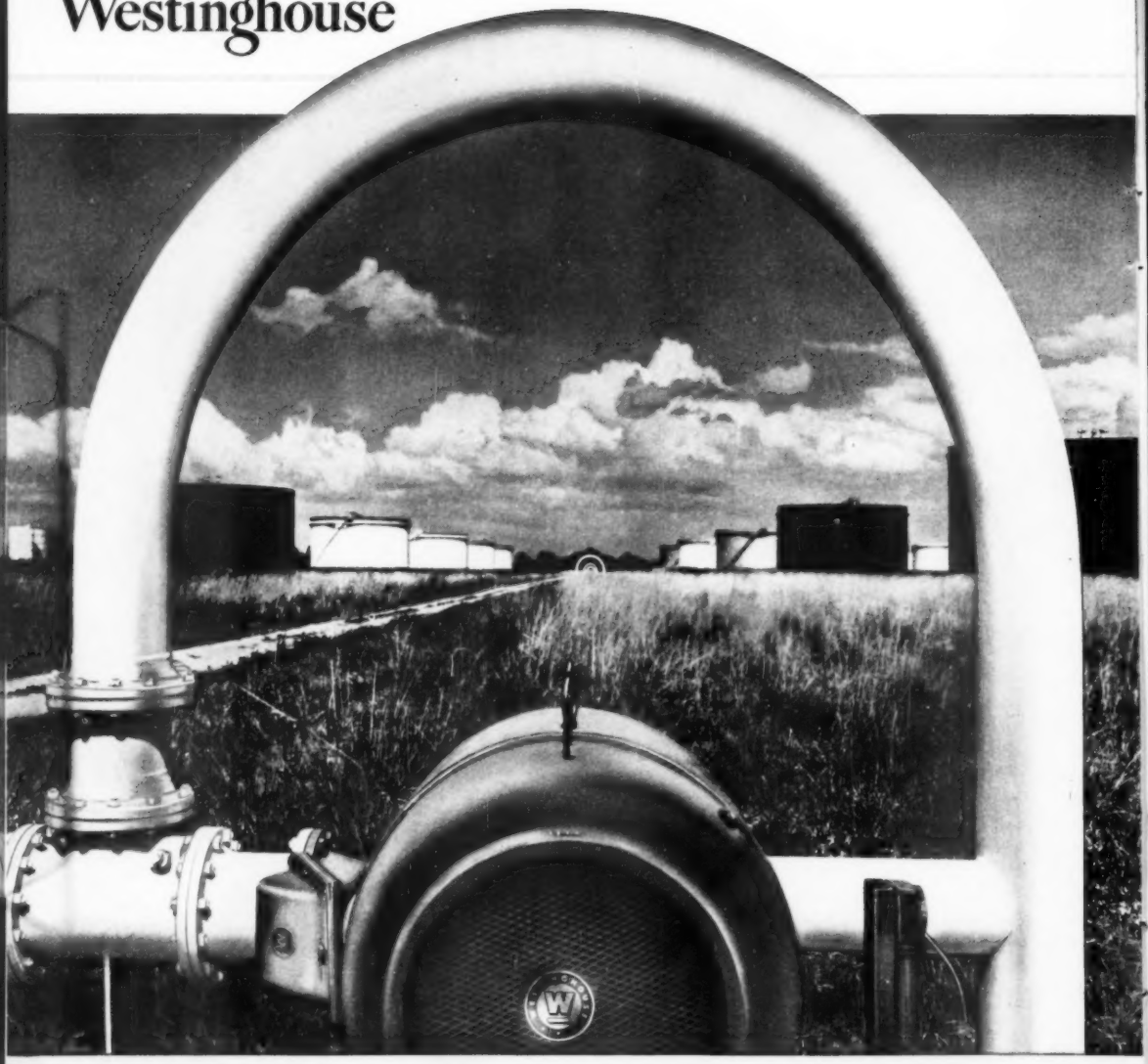
YOU CAN BE **SURE**.. IF IT'S

Westinghouse



WORKING PARTNERS

Power equipment for pipe lines of any size or length, from oil wells to refineries to marketing centers, can be supplied *in entirety* by Westinghouse. Implementing the vital phase of land transportation is but one part of the Westinghouse role of working partner to the petroleum industry. When you want dependable power equipment with undivided responsibility, come to Westinghouse.

Westinghouse

Top Pipe-Line Performance Calls for Co-ordination

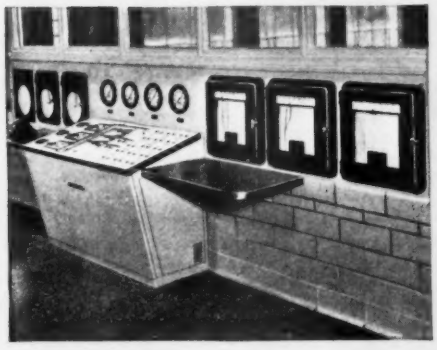
A modern, electrified pipe-line project calls for complete co-ordination of both engineering and equipment. Only in this way can the aims of low investment, low operating cost and uninterrupted performance of the pipeline be fully attained.

Westinghouse can provide this co-ordination. In electrical equipment, we can furnish everything needed, including complete outdoor substations, motors for main-line and auxiliary drives, starting equipment, control desks, motor-driven blowers for ventilation, auxiliary power and lighting distribution and cathodic protection equipment.

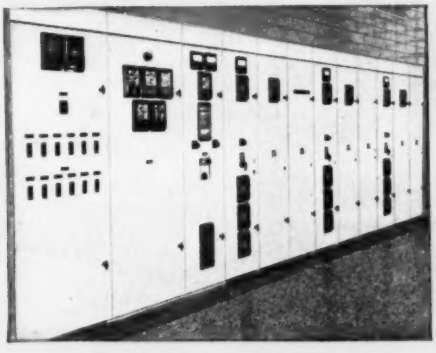
For engine-driven stations, Westinghouse step-up gears provide efficient and reliable transmission of power from engine to pump, permitting each to operate at its most advantageous speed. In such stations we can furnish complete generating, distribution, motor and control equipment to meet the requirements of auxiliary drives.

In service, we can provide engineering facilities based on experience with scores of pipe lines, many of them 100% Westinghouse-equipped. These range from small gathering lines to the largest electrically-driven crude and refined-products pipe lines ever built.

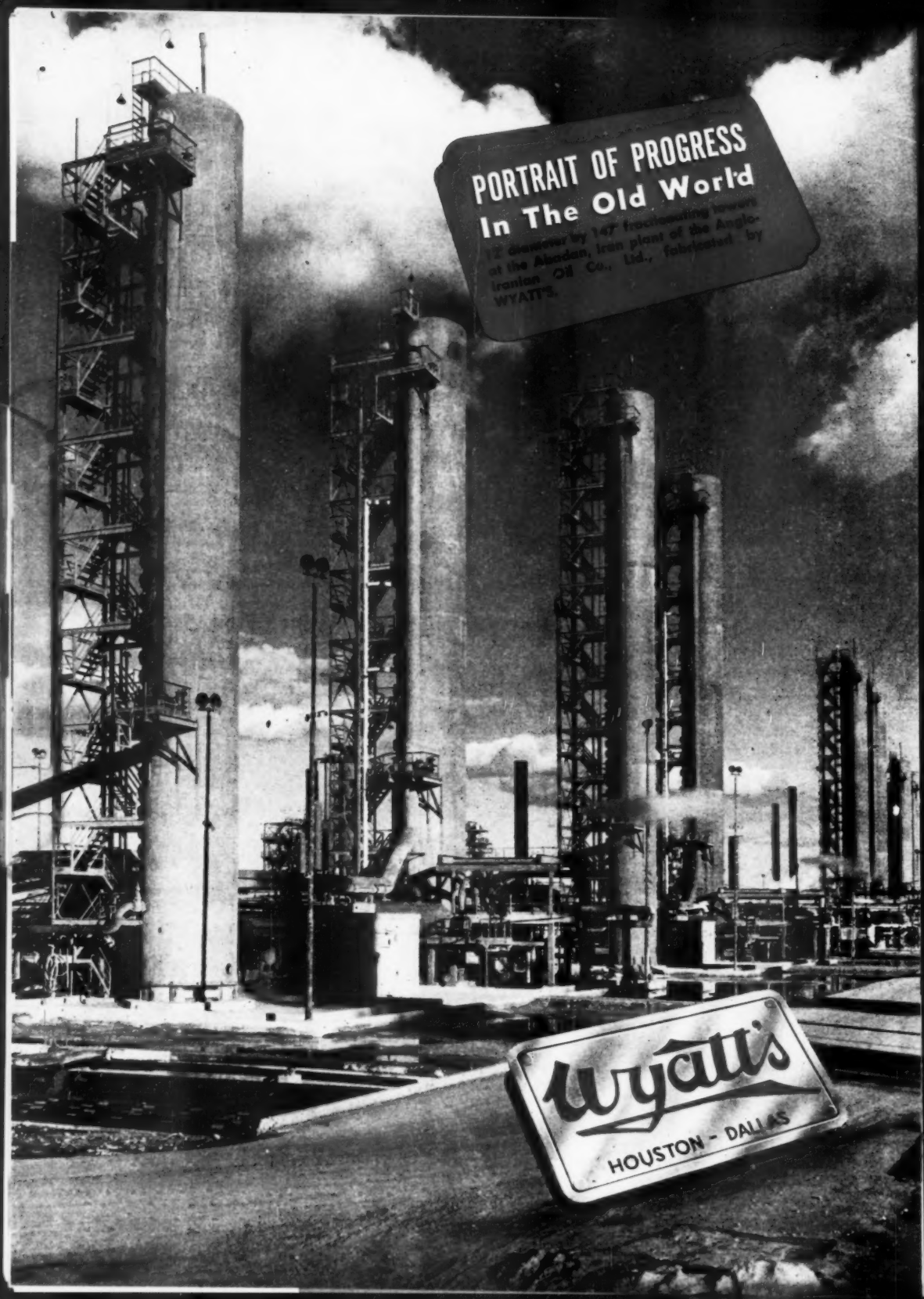
Westinghouse petroleum industry specialists are available to assist you in working out integrated plans. Call your nearest Westinghouse District Office, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-94801

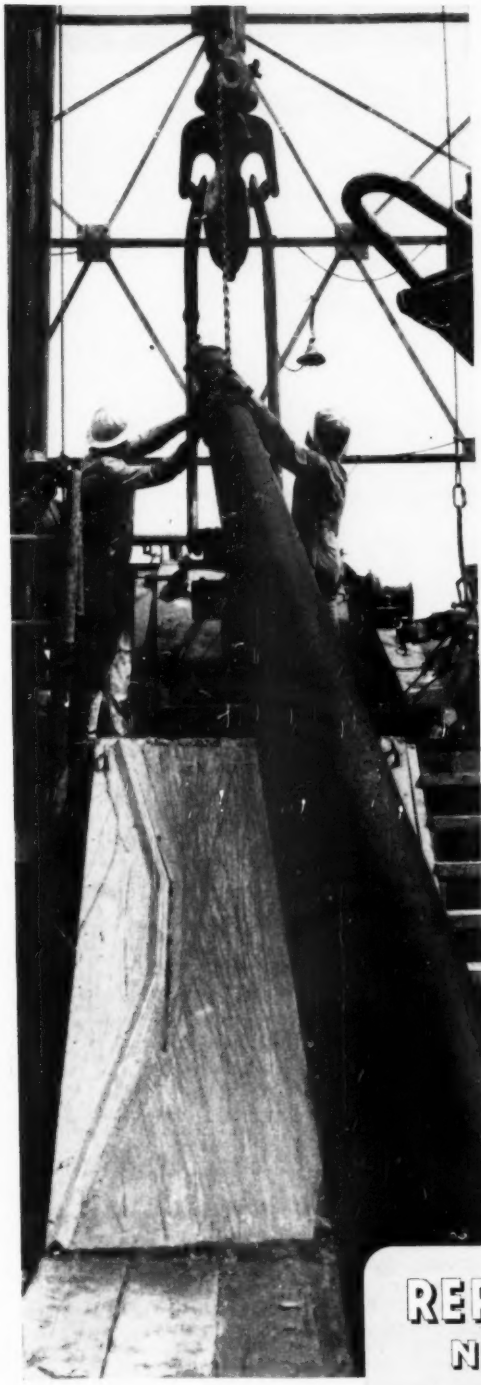


This control desk in a semiautomatic station has flow recorder and controllers for station suction and discharge pressures at left, pushbutton co-ordinated electrical control for pump units and motorized valves in center with pressure gages on panel above, and protective thermocouple recorders at right.



"Unitized" Metal-Clad Switchgear in a semiautomatic pump station, showing (left to right) low-voltage distribution, sequence control for automatic operation of pump units and valves, control of the outdoor main breaker, and reduced-voltage starting equipment for three main-line pump units.


PORTRAIT OF PROGRESS
In The Old World
12' diameter by 147' fractionating towers at the Abadan, Iran plant of the Anglo-Iranian Oil Co., Ltd., fabricated by WYATT'S.
Wyatt's
HOUSTON - DALLAS



RUNNING TIME:

1000 feet per hour

with

REPUBLIC ELECTRIC WELD CASING

● A Louisiana driller landed a 4980-foot string of 7-inch J-55 Republic Electric Weld Casing in five hours, thirty minutes. A Texas contractor ran 6208 feet of 5½-inch H-40 in just six hours. Both these strings were run at an *average rate close to 1000 feet per hour.* A California drilling contractor ran 7051 feet of 7-inch J-55 Republic Casing in *nine hours flat, including time for cementing with 600 sacks.*

These reports are typical of hundreds more attesting to the remarkable running speed made possible with this advanced casing. Its straight, true lengths handle easily and stab quickly. Clean, full-formed threads spin-in and tong-up *fast* and tight . . . save plenty of man-hours on every job.

In addition to fast make-up, accurate threads with a substantial amount of tough steel under the root line mean extra joint strength . . . fewer pull-outs. Next time you order, specify the tubular products with a reputation for top running speed—Republic Electric Weld Casing and Tubing.

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GENERAL OFFICES • CLEVELAND 1, OHIO

Export Department: Chrysler Building, New York 17, New York

Republic Electric Weld Casing and Tubing are made from flat-rolled steel, both sides of which are inspected. Thus, the surface which becomes the inside wall is free from hidden defects.

REPUBLIC *Electric Weld*

NORMALIZED CASING AND TUBING

Other Republic Products include Line Pipe—Carbon, Alloy and Stainless Steels—Upson Studs, Bolts and Nuts—Electrunite Heat Exchanger Tubes

IT'S HERE...

NEW Ford "120" POWER UNIT

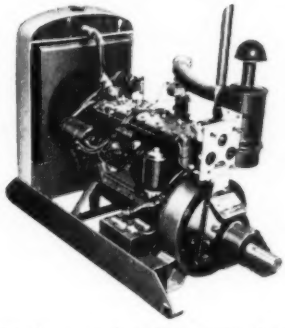
Removable dry cylinder liners . . . 3-ring pistons, chrome top ring . . . Moly-chrome valve seat inserts . . . Circulating cooling system with thermostat . . . Replaceable thin shell main and connecting rod bearings . . . Counterbalanced crankshaft . . . Magneto or battery ignition . . . Oil filter . . . Heavy duty oil bath air cleaner.

NEW Ford "226" POWER UNIT

Pad mounted oil filter . . . Full length water jacketing . . . Recirculating pressure cooling system with thermostat . . . Counterbalanced crankshaft . . . Heavy duty, replaceable thin shell copper lead bearings . . . High lift camshaft . . . Balanced carburetion (downdraft or updraft) . . . Heavy duty oil bath air cleaner.

Complete

NEW Ford "254" POWER UNIT



Pad mounted oil filter . . . Recirculating pressure cooling system with thermostat . . . Autothermic pistons with chrome top compression ring . . . High lift camshaft . . . Hard faced cobalt exhaust valve (free type valves) . . . Counterbalanced crankshaft . . . Heavy duty, replaceable thin shell copper lead bearings . . . Balanced carburetion (downdraft or updraft) . . . Air cleaner.

NEW Ford "239" POWER UNIT

Dual water pumps . . . Full length water jacketing *plus* . . . Recirculating pressure cooling system with thermostat . . . Fully counterbalanced crankshaft . . . Replaceable thin shell bearings . . . Moly-chrome valve seat inserts . . . Dual downdraft carburetion . . . Oil filter and air cleaner.

RIGHT for Centrifugal Pumps . . . Arc Welders . . . Air Compressors . . . Cranes and Hoists . . . Winches . . . Railway Cars . . . Generator Sets . . . Crane Loaders . . . Feed Grinders . . . Mechanical Shovels . . . Portable Sawmills . . . Portable Well Drillers . . . Farm Combines . . . Street Flushers . . . Concrete Mixers . . . Portable Grain Mills . . . Irrigation Equipment . . . Log Yarders and Loaders—and many other applications.

Specifications of Ford Industrial Engine Power Units

Model	Cylinders	Bore and Stroke	Displ. cu. in.	Dyn. B.H.P.	Max. Torque	Equipment Available
120	4	3⅛ x 3¾	120	38 @ 2400	92#' @ 1600	Clutch; SAE #5 housing; power take-off; Ford housing; 3- or 4-speed transmission; governor. (Available as closed type power unit or engine assembly.)
226	6	3.3 x 4.4	226	80 @ 2400	182#' @ 1200	Clutch; SAE #3 or #4 housing; power take-off; Ford housing; 3-, 4- or 5-speed transmission; governor. (Available as closed or open type power unit, or engine assembly.)
239	V-8	3⅛ x 3¾	239	85 @ 2400	187#' @ 1600	Clutch; SAE #3 or #4 housing; power take-off; Ford housing with 3-, 4- or 5-speed transmission; governor. (Available as closed or open type power unit, or engine assembly.)
254	6	3.5 x 4.4	254	95 @ 2400	212#' @ 1200	Clutch; SAE #3 or #4 housing; power take-off; Ford housing; 3-, 4- or 5-speed transmission; governor. (Available as closed or open type power unit, or engine assembly.)
337	V-8	3½ x 4⅜	337	117 @ 2400	257#' @ 1600	Clutch; 5-speed direct-in-fifth transmission; overdrive transmission, direct drive power take-off. (Available as closed or open type power unit, or engine assembly.)

FORD

Industrial Engine Power Units ARE RIGHT 3 WAYS for your job!

1 **RIGHT POWER**—five great models in wide variety of units. Each one ready to run!

2 **RIGHT FEATURES**—all the latest advancements of Ford's famed progressive engineering.

3 **RIGHT SERVICE**—as near as your nearest Ford Dealer, clear around the world.

Line of NEW Ford INDUSTRIAL ENGINE POWER UNITS!

NEW Ford "337" POWER UNIT

Drop forged fully counterbalanced crankshaft, hardened journals . . . Heavy duty, replaceable thin shell copper lead bearings . . . Hard faced cobalt exhaust valves (free type valves) . . . Autothermic pistons, chrome top ring . . . Dual centrifugal water pumps . . . Full length water jackets . . . Recirculating pressure cooling system with thermostat . . . Dual downdraft carburetion . . . Oil filter and air cleaner.

YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED

For Special Literature on Ford Industrial Power Units, use this coupon . . .

Industrial Engine Department

FORD MOTOR COMPANY

DEARBORN, MICHIGAN

● Ford Industrial Power Units are now available in five great models . . . four, six and V-type eight cylinder . . . 120 to 337 cu. in. displacement. *COMPLETE* with radiator . . . instrument panel and S.A.E. or Ford type housings. Foot or skid mounted. Closed and open types. Made throughout to Ford's famed hi-precision manufacturing standards. Completely tested and *READY TO RUN!*

Ford Dealers, Ford District Sales Offices and the Ford Industrial Engine Department are at your service in developing engineering recommendations showing how Ford Industrial Power Units can be most effectively applied to your job. *Mail coupon below for Ford Industrial Power Unit Folder.*

Send me comprehensive literature about the new Ford Industrial Power Units. Address: **Industrial Engine Dept., Ford Motor Co., Dearborn, Mich.**

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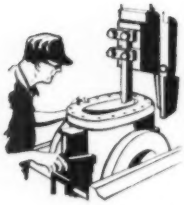

A DISTINCTIVE FEATURE IN DISC GUIDING

Body guides are machined down to precision tolerances, assuring a perfect guide for the disc and creating a positive center line on which all subsequent machining operations are based.

BODY PRECISION MACHINED TO INSURE PERFECT FIT OF SEAT RINGS

This operation makes inserting the seat rings in a Lunkenheimer gate valve simply a matter of screwing them into position. Parts can be replaced without any machine work or special fitting.

Fig. 1430
Iron Body Gate Valve

Fig. 1430 and complete line of I.B.B.M. and All Iron Gate Valves are described in Circular 564. Mailed upon request.

Precision Made LUNKENHEIMER VALVES....

assure perfect-fitting, interchangeable parts . . . longer valve life . . . easier, lower-cost maintenance!

THE smooth working efficiency and low maintenance cost of Lunkenheimer Valves were not "made in a day." Behind this superior performance and economy lies long experience, top engineering and metallurgical facilities together with the most modern manufacturing equipment.

Lunkenheimer Valves have a streamlined simplicity of design . . . a minimum of working parts, each part of extra strength, correctly proportioned and perfectly balanced. This assures longer life with lower maintenance expense.

LET THE LUNKENHEIMER DISTRIBUTOR "TAKE OVER" YOUR INVENTORY PROBLEMS!

There are Lunkenheimer Distributors in every petroleum and refining center. Their stocks help you reduce inventory overhead and obsolescence.

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TIMKEN CARBON STEEL TUBES Generally for service not exceeding 900°F., where corrosion and oxidation resistance are not important.

TIMKEN SICROMO 2 STEEL TUBES For service up to 1200°F., where better scale resistance is required than can be obtained with 2% Cr. ½% Mo. Steel.

TIMKEN SICROMO 5 S STEEL TUBES For oxidation resistance to 1500°F. Good creep strength and corrosion resistance to 1300°F.

TIMKEN CARBON-MO STEEL TUBES For temperature up to 1000°F. Improved creep strength makes it safer than carbon steel.

TIMKEN SICROMO 7 STEEL TUBES For applications requiring better corrosion resistance than can be obtained with 5% Chromium type steels.

TIMKEN 2¼% CR-1.0% MO STEEL TUBES For service up to 1150°F. Has greater resistance to creep than 2% Cr. ½% Mo. Steel.

TIMKEN DM STEEL TUBES For service up to 1150°F. This steel offers outstanding creep strength.

TIMKEN SICROMO 3 STEEL TUBES For service up to 1200°F. Have excellent oxidation resistance and good corrosion resistance.

TIMKEN SICROMO 9 M STEEL TUBES This steel possesses the maximum corrosion resistance of any of the steels below the stainless group.

TIMKEN 2% CR-½% MO STEEL TUBES For service up to 1150°F. Intermediate corrosion resistance plus good creep strength, fair oxidation resistance.

TIMKEN 4-6% CR MO STEEL TUBES For service up to 1200°F. Superior corrosion resistance. Less oxidation resistance than Sicromo 3.

TIMKEN 18-8 STEEL TUBES Shows the best combination of creep strength, oil corrosion resistance and oxidation resistance up to 1500°F.

Take one of these 12 steps to a better LIFE/COST ratio

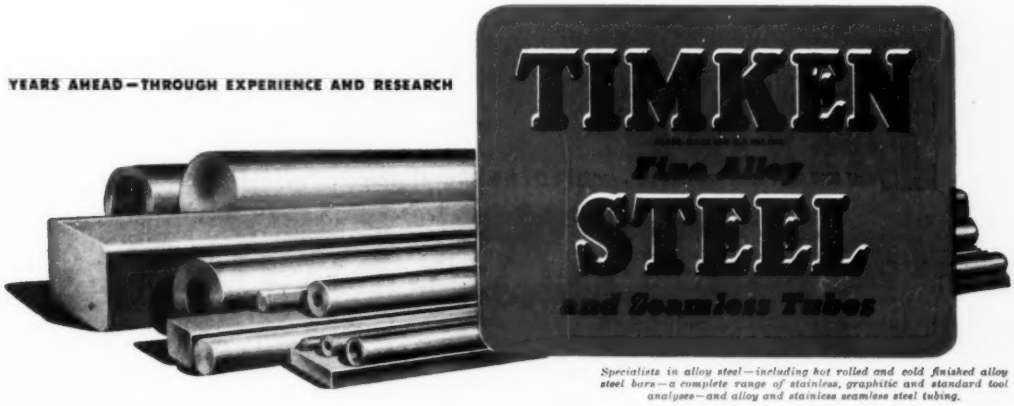
IF you have a high temperature tube problem, chances are you can solve it—and get a better life/cost ratio, too—by switching to one of the twelve Timken® steels above.

These twelve steels are specially developed by The Timken Roller Bearing Company to cope with specific problems of heat, pressure, corrosion, and oxidation ...and to do it at lowest possible cost. Through analysis of your particular requirements, our Technical Staff can help you select the one steel that's best for your job. Their recommendations are backed by 19 years of experience and research in high temperature applications.

And whichever analysis is selected, you're sure of uniformly high quality because of Timken's outstanding quality control through every step in production.

Let our Technical Staff help you select your next high temperature tubes. There's no cost or obligation. For further information on high temperature tubing, write or wire The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH



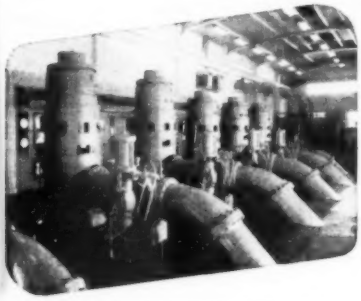
Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.

What About the Reputation of the Builder

•

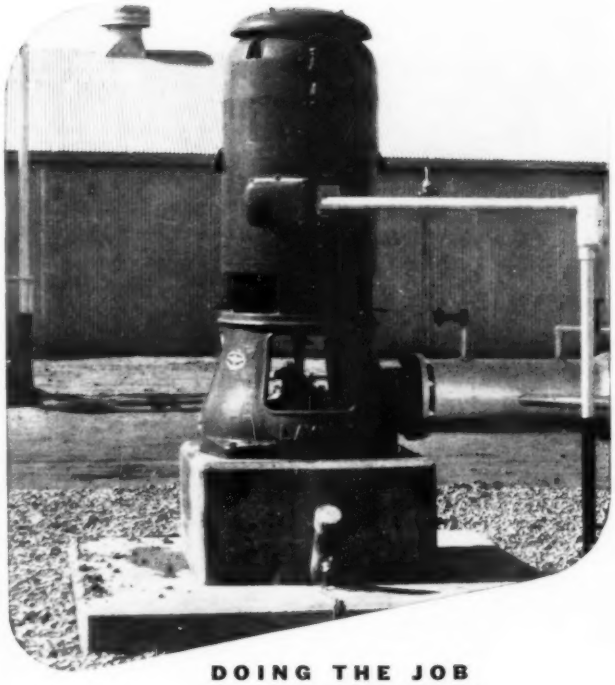
A good reputation is more precious than great skill and fine quality. Strangely enough, a good reputation cannot be bought, nor is it ever offered for sale. It can only serve as a bond of human confidence so vital in modern business transactions. For seventy years Layne has been building a good reputation. The task isn't complete yet, nor will it ever be. But the job is far enough advanced to be bringing in many fine orders for Layne equipment and services. As a basic policy, it has aided Layne to become a great world-wide organization.

When you buy a Layne Well Water System or a Layne Vertical Turbine Pump, you are getting the assurance that if Layne equipment does not make good—the Layne Organization will!



VERTICAL TURBINE PUMPS . . .

are built in a range of sizes from 40 to 16,000 gallons per minute. Write and outline your pumping problems, or request a Layne Vertical Turbine Pump Catalog.



DOING THE JOB —COMPLETE!

Layne's planning supplements that of your own engineers, but Layne's work is complete from the test well to the finished, and in operation units—proven in production volume and fully adjusted for the task to be performed. Such a service is widely welcomed by the Nation's greatest—and sometimes smallest cities and industrial plants. It is an over-all service that saves time and gives universal satisfaction.

For further information, literature, etc.,

Address

LAYNE & BOWLER, INC.
GENERAL OFFICES, MEMPHIS 8, TENN.

LAYNE

BUILDERS OF HIGH EFFICIENCY

WELL WATER SYSTEMS

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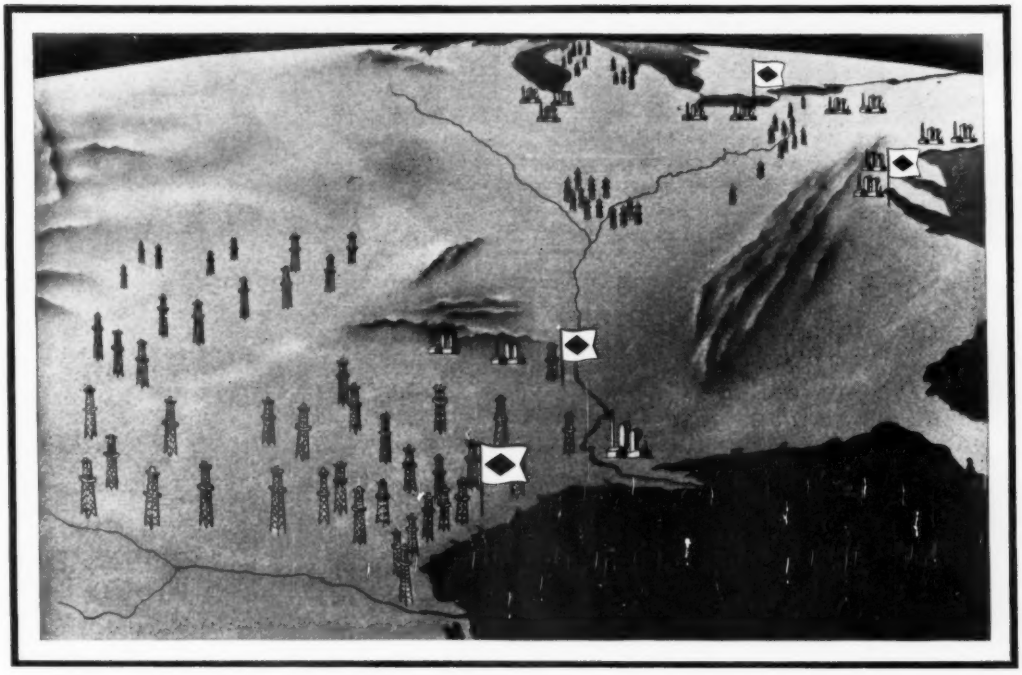
SODA ASH ★ CAUSTIC SODA ★ CHLORINE

Chemicals you live by

CHROMATES ★ BICARBONATE OF SODA ★ SILICATE OF SODA



WHAT THIS MAP MEANS TO YOU

It takes a steady flow of caustic soda and chlorine to fill the growing needs of the oil industry's production and refining activities. And—from the Southwest to the Atlantic—DIAMOND ALKALI'S string of chlorine-caustic soda plants fits your industry's operation like a glove. This means dependability of supply, speedy shipments and a service geared to your needs.

In addition to DIAMOND'S four producing centers for caustic soda and chlorine, there are warehouse points maintained by the company and its distributors in more than 100 cities to supply your l.c.l requirements. Sales offices are spotted in convenient cities from Texas to New England. And DIAMOND'S Technical Service Staff is ready to help you with any problems involving the chemicals we supply.

We have shaped our services to meet your needs. Why not let a DIAMOND salesman make your acquaintance today?

DIAMOND SALES OFFICES: Boston, New York, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, St. Louis, Memphis and Houston. Also representatives in other principal cities.

DIAMOND CHEMICALS FOR THE OIL INDUSTRY

DIAMOND ALKALI COMPANY...CLEVELAND 14, OHIO

DIAMOND ALKALI CHEMICALS

FWD Announces a

LIGHT-DUTY

FOUR WHEEL DRIVE

Created for an Entirely New FWD work-range.. In Answer to Demand

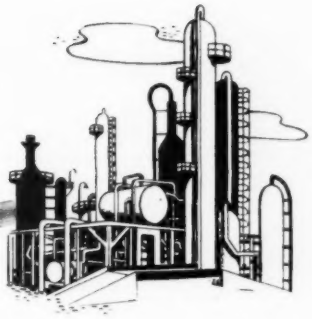
One of the most important developments in 40 years of FWD leadership! Here is a completely new Four Wheel Drive . . . designed to broaden the range of operation in the light-duty truck field. Now you can have a *true* Four Wheel Drive to completely fill the needs which *conversions* and conventional trucks have sought to answer. This new model — the LD — fulfills countless requests for an FWD in that broad field.

GET ALL THE FACTS on the LD! Ask for this folder, "The Story of the LD". See your FWD distributor or write FWD.

THE FOUR WHEEL DRIVE AUTO CO.
CLINTONVILLE, WIS.
Canadian Factory: Kitchener, Ont.
World-Wide Sales and Service

Built by the Makers of America's Foremost Heavy-Duty Trucks

PIPE
GETS IT THERE!



Between a motorist's gas tank and crude petroleum lies an amazingly complex production problem. We at Wheatland, as producers of steel pipe used by the industry, are aware of pipe's key importance in solving production problems. We pledge that every foot of Wheatland pipe we supply will be of the best quality skill and science can possibly fabricate.

-pipe with the yearmark!

WHEATLAND TUBE COMPANY

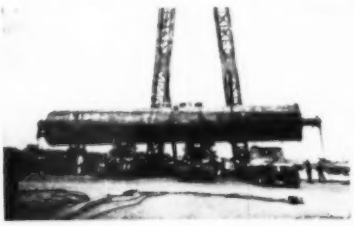
BANKERS SECURITIES BUILDING • JUNIPER AND WALNUT STREETS • PHILADELPHIA 7, PA.

Yours the problem – Harveys the answer!

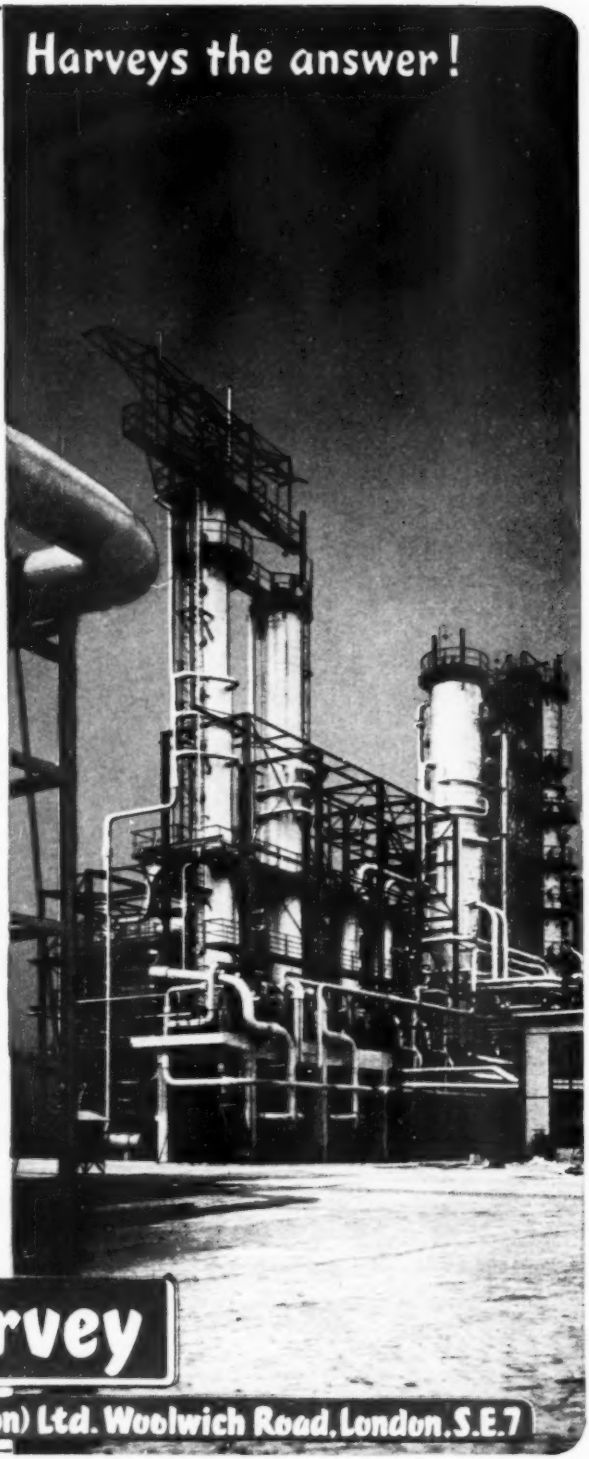
Because Harveys have one of the most modern and complete plants in the world, housing up-to-date Rolling, Bending, Pressing and Welding Equipment, operated by an experienced staff, they can supply the answer to even the most complicated plate-work problem. Typical examples of their work for the Oil Industry are shown in the accompanying photographs of Fractionating Columns supplied to the Royal Dutch Shell Group at their Pernis Refinery near Rotterdam.

A completely fabricated column is lowered into the Thames near the works—

Towed across the North Sea to Holland—



and lifted from the water at Pernis—quickly to take its part in this new Oil Refinery.



Send for Catalogue OG 750.

Harvey

G. A. Harvey & Co. (London) Ltd. Woolwich Road, London, S.E.7

MOISTUREPROOF ... FIREPROOF

PC Foamglas

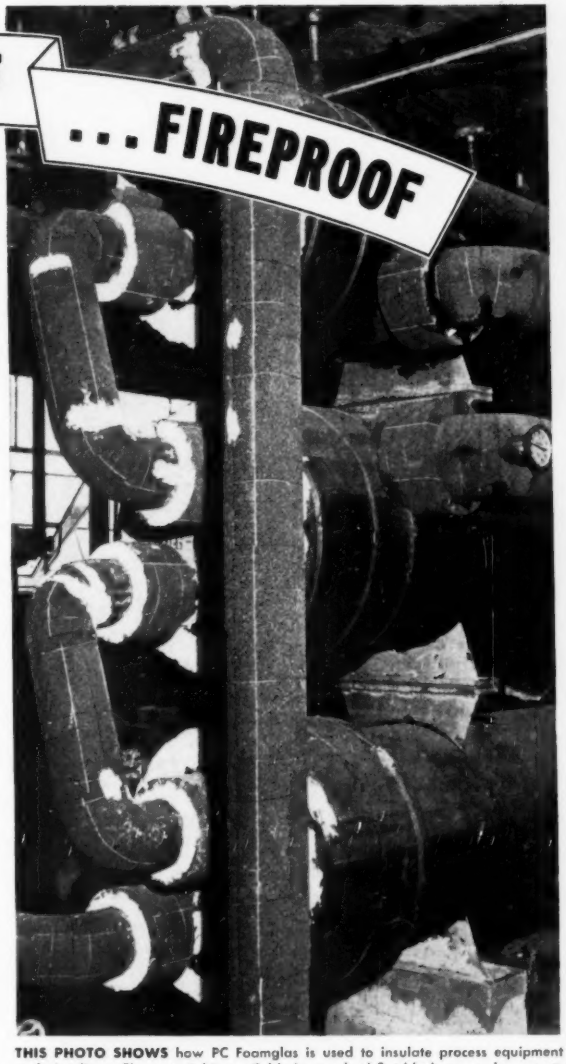
...the permanent insulation

● Because it is composed of millions of tiny sealed glass bubbles, moisture and vapor cannot enter or pass through PC Foamglas Insulation. Being glass, Foamglas will not burn, acts as a fire-retardant when used with combustible materials.

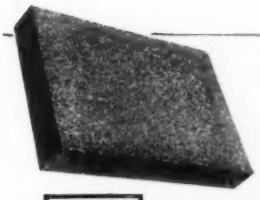
Unlike absorbent materials, the insulation value of PC Foamglas remains constant even in humid and corrosive surroundings. Being a true glass, Foamglas is also fumeproof and acidproof, impervious to many elements that attack other materials. Properly installed, PC Foamglas retains its original insulating efficiency *permanently*.

And PC Foamglas has long since proved its ability to maintain high or low temperatures, indoors and out. In has met all tests successfully . . . on tanks, towers, retorts and other large vessels . . . on hot and cold piping and on a wide variety of equipment in the petroleum and other processing industries.

Our insulation specialists will be glad to help you work out your individual problems. Meanwhile, send the coupon for our free booklet on typical uses of Foamglas. We'll also include a free sample of this *permanent* insulating material.



THIS PHOTO SHOWS how PC Foamglas is used to insulate process equipment and pipe lines. The material is available in standard flat blocks, curved segments and beveled lags to fit equipment sides, heads and domes, and in preformed sections for standard pipe sizes and fittings.



This is FOAMGLAS®

The entire strong, rigid block is composed of millions of sealed glass bubbles. They form a continuous structure, so no air, moisture, vapor or fumes can get into or through the Foamglas block. In those closed glass cells, which contain still air, lies the secret of the material's permanent insulating efficiency.

For additional information see our inserts in Sweet's Catalogs

Pittsburgh Corning Corporation
Dept. S-20, 307 Fourth Avenue
Pittsburgh 22, Pa.

Please send me, without obligation, a sample of PC Foamglas, and your free booklet on industrial insulation.

Name.....

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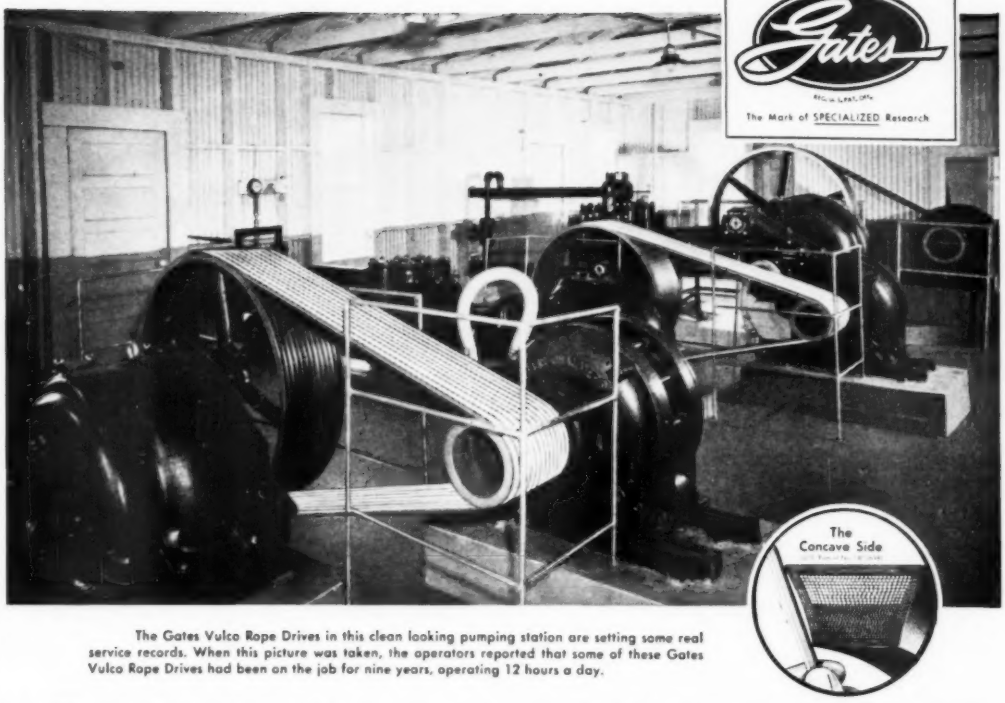
City.....State.....

PITTSBURGH PC CORNING

® **FOAMGLAS INSULATION**

... when you insulate with FOAMGLAS... you insulate for good!



The Gates Vulco Rope Drives in this clean looking pumping station are setting some real service records. When this picture was taken, the operators reported that some of these Gates Vulco Rope Drives had been on the job for nine years, operating 12 hours a day.

Two Distinct *Savings* in *V-Belt Costs* Are *Yours* with Gates Vulco Ropes

A simple test that takes less than two minutes will save you many dollars in V-Belt costs. Here it is—

Have someone bend a V-Belt exactly as it bends in going around its pulley. As it bends, grip its sides with your fingers. You will *feel* those sides *change shape*. In a straight-sided V-Belt, the sides become *convex* as the belt bends. And note how the sides *bulge out*. (Figures 1 and 1A)

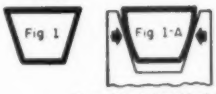
Now try the same test with a V-Belt that is built with the concave side. You will feel a change in shape—but a *different result!* The sides do not become *convex*. Instead, they become perfectly straight. *The bent belt now has a shape that exactly fits its sheave groove*—as shown in Figures 2 and 2A.

Two distinct savings result. *First*—There is no side-bulge to cause uneven wear. The sides press *evenly* against the V pulley and therefore wear *uniformly*—resulting in *longer life!* Second—The *full width* of the sidewall grips the pulley—thus carrying heavier loads without slippage—and this *saves belts* and also saves *power!*

When you buy V-Belts, be sure you get the V-Belt with the Concave Sides... the Gates Vulco Rope!

What Happens When a V-Belt Bends

Straight-Sided V-Belt



How Straight-Sided V-Belt Bulges in Sheave-Groove.

Gates Vulco Rope with Concave Side.

No Side Bulge. Precise Fit in Sheave Groove.

C S. 501

THE GATES RUBBER COMPANY
DENVER, U.S.A.
The World's Largest Makers of V-Belts

GATES VULCO ROPE DRIVES
Engineering Offices and Jobber Stocks IN ALL INDUSTRIAL CENTERS of the U. S. and 71 Foreign Countries

Exclusively, W-K-M

No other valve provides these exclusive W-K-M Valve features . . . whether for low or high pressures: a round, full bore conduit opening entirely through the valve in open position . . . parallel expanding gates which expand outwardly to seal on both sides instead of wedging or jamming . . . over size bronze renewable seats . . . automatic lubrication from lubricant contained in body and bonnet.

Exclusively W-K-M, too, is a large and competent field organization qualified to consult with, and to render field emergency service and otherwise assist our customers in obtaining satisfactory service and longer life from their W-K-M Through Conduit Lubricated Gate Valves.

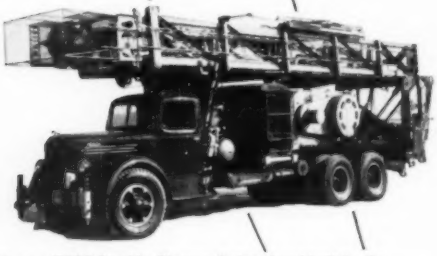
W-K-M Company

OIL FIELD, PIPE LINE & INDUSTRIAL EQUIPMENT

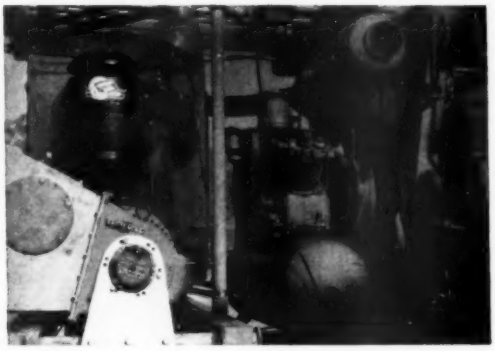
HOUSTON, TEXAS, U. S. A.
LOS ANGELES

Cable Address: "WILKOMAC"
Export Office: 30 Rockefeller Plaza, New York, N. Y.

New Ideco "Rambler Rig" Drives Through Twin Disc Torque Converter



This new IDECO Rambler Rig was designed and built for the Asiatic Petroleum Corporation. Shown at right is a closeup of the Twin Disc Hydraulic Torque Converter that is standard equipment on IDECO portable drilling units.



Exact and automatic matching of drill bit speed to rock formation hardness . . . *plus automatic torque multiplication up to five times* for hoisting operations!

These are only two of the many outstanding features of this latest IDECO Rambler Rig. And they are results of driving power through a Twin Disc Hydraulic Torque Converter.

But there are other advantages you gain when you equip your rig with a Twin Disc Torque Converter (Lysholm-Smith type): 1. a *fluid link* between your engine and all driven equipment that absorbs metal-fatiguing vibrations and dampens destructive shock loads; 2. faster, smoother hoisting speeds because you get more flexible power at the hook; 3. full control of working speed by throttle alone . . . no gearshift guesswork.

For more complete information on how to boost the performance of your rig, see your dealer now, or write direct for Torque Converter Bulletin 135-C. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

This **HOMESTEAD VALVE** opens or closes instantly . . . every time . . . any time

IT'S STICK-PROOF BECAUSE IT'S LEVER-SEALD

HOMESTEAD LEVER-SEALD QUARTER-TURN VALVES have been first choice for more than 16 years in services where extremes of temperature or pressure, or corrosive fluids, cause ordinary valves to "stick" or "seize".

They are "stick-proof" because built into each valve is a powerful lever-and-screw device that prevents sticking and assures positive action at all times under all conditions.

They operate faster too, than screw-stem type valves . . . 16 to 28 times faster. And the quarter-turn principle makes them ideal for installation in restricted areas, next to walls, floors, ceilings, congested piping and other obstructions where other types of valves could not be used. Next time you have a sticking or damaged valve replace it with a Homestead LEVER-SEALD Quarter-Turn Valve. You'll never be satisfied with ordinary valves again.

Homestead Lever-Seald Quarter-Turn Valves are available in metals and alloys to suit your needs in sizes from 1½" to 10" for pressures from vacuum to 1500 lbs.

- **Instant Stick-Proof Operation.**
- **Quarter-turn fully opens or closes.**
- **Seating surfaces always protected. Corrosion practically eliminated.**
- **Unobstructed straight-line fluid flow.**
- **All moving parts protected from effects of service conditions and weather.**

For full particulars send for "Valve Reference Book No. 39-3." Write today.

HOMESTEAD VALVE MANUFACTURING CO.

"Serving Since 1892"

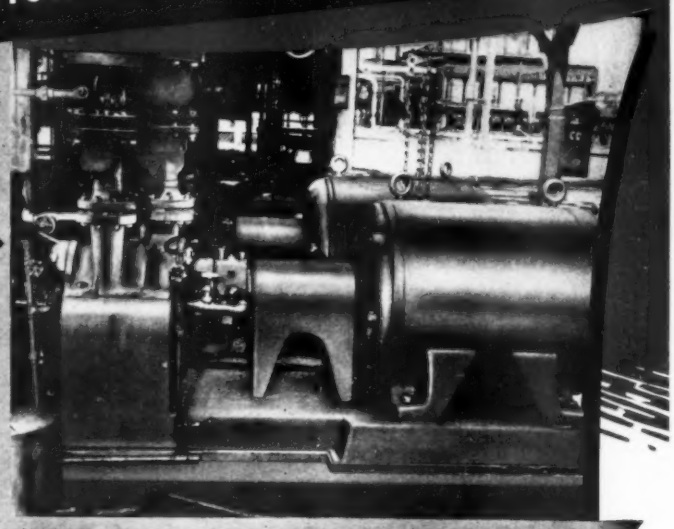
P. O. Box 403 **Coraopolis, Pa.**

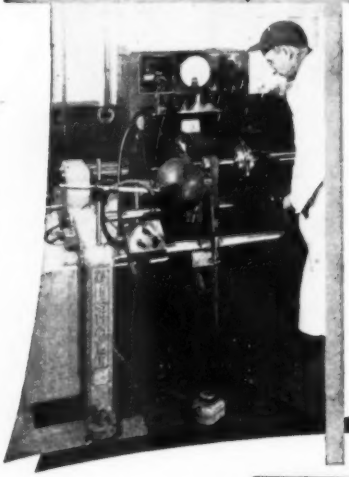
Bingham PUMPS
...PRECISION BUILT...FIELD PROVEN

BINGHAM PUMPS have been *field proven* for the severe services of pumping oil products such as Residuum, Flash Tower Bottoms and Black Oil Recycle in which the oil carries in suspension pieces of hard coke of irregular size and shape. Right — battery of Bingham Koke-Krusher Pumps handling black oil (Flash Tower) at ESSO Standard Oil Company's Bayway Refinery, Linden, N. J.

* * *

An important factor in Bingham *precision-built* Single and Multi-Stage pumps is the static and dynamic balancing of all impellers and rotating parts. By means of the Gishold Dynetric balancing equipment shown below, which is typical of the precision machinery in our new modern plant, all rotating parts are perfectly balanced—an important factor in the low maintenance and sustained high operating efficiency record of Bingham pumps.





Bingham KOKE-KRUSHER PUMPS

This centrifugal pump does what heretofore has been considered impossible—it actually crushes entrained solids in the pumpage. A durable, positive crushing mechanism located in the suction chamber in front of the impeller eye instantly breaks up and pulverizes all pieces of solid material before pumpage enters the impeller. More hours on stream —Less down time—Less maintenance.

SEND NOW for Koke-Krusher Folder 106

Tells why it is sound economy to use the Koke-Krusher on new installations or for the replacement of worn-out, old style reciprocating pumps. Wire, write, or phone the Bingham Pump Sales Office nearest you.

Bingham PUMPS — DOUBLE VOLUTE RADIAL BALANCE

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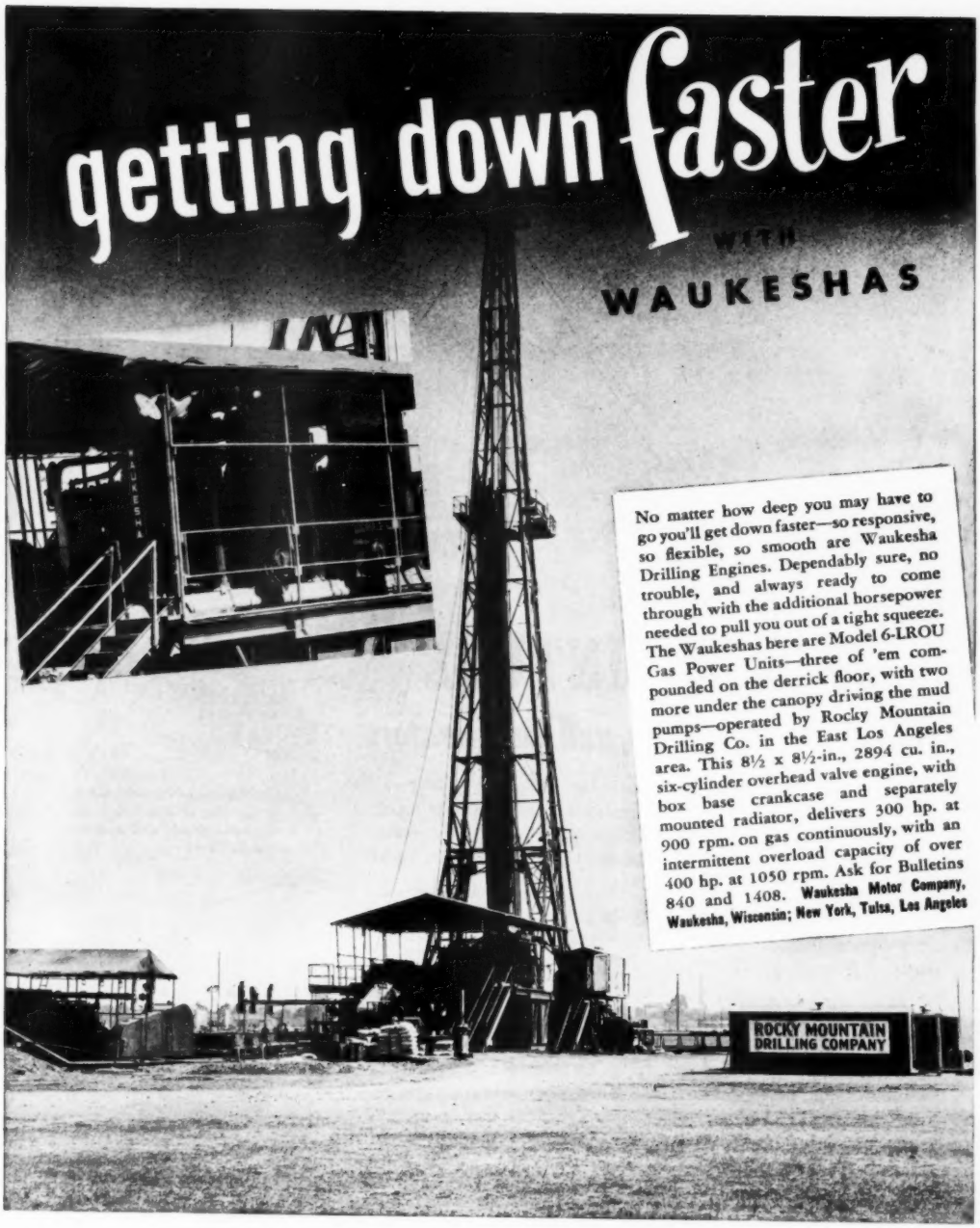
getting down faster

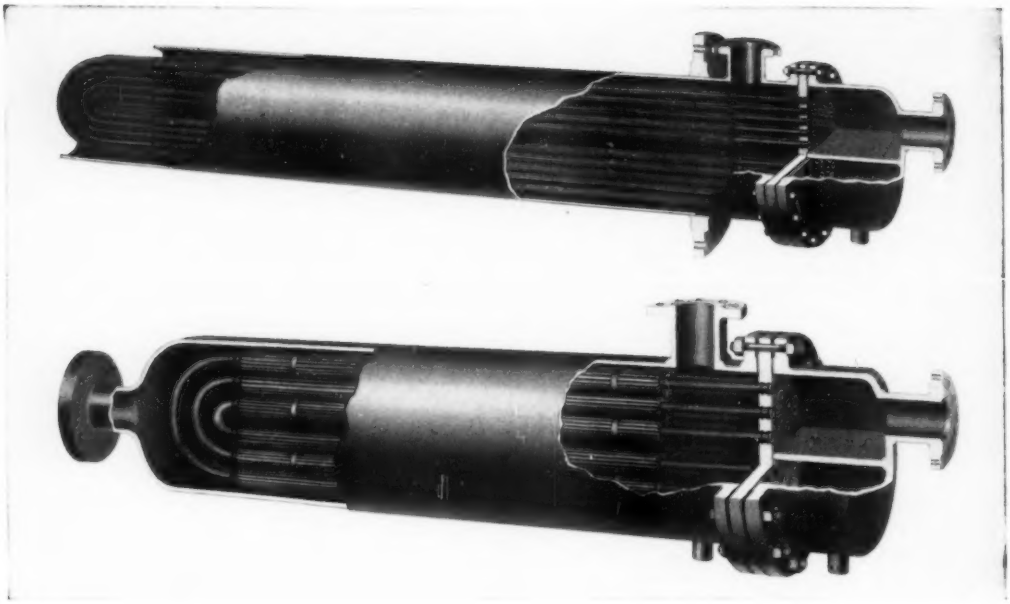
WITH

WAUKESHAS



No matter how deep you may have to go you'll get down faster—so responsive, so flexible, so smooth are Waukesha Drilling Engines. Dependably sure, no trouble, and always ready to come through with the additional horsepower needed to pull you out of a tight squeeze. The Waukeshas here are Model 6-LROU Gas Power Units—three of 'em compounded on the derrick floor, with two more under the canopy driving the mud pumps—operated by Rocky Mountain Drilling Co. in the East Los Angeles area. This 8½ x 8½-in., 2894 cu. in., six-cylinder overhead valve engine, with box base crankcase and separately mounted radiator, delivers 300 hp. at 900 rpm. on gas continuously, with an intermittent overload capacity of over 400 hp. at 1050 rpm. Ask for Bulletins 840 and 1408. **Waukesha Motor Company, Waukesha, Wisconsin; New York, Tulsa, Los Angeles**

WAUKESHA *Diesel Power...* *...Gas Power* **POWER**



BROWN FINTUBE

Tank Suction Heaters and Line Heaters

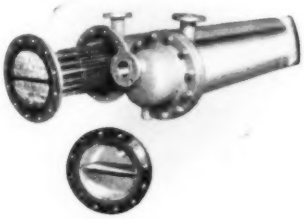
● Brown Fintube Tank Suction Heaters are moderately priced and highly efficient. They heat viscous oils so that they can be pumped more easily, and bolt or weld to a tank nozzle, or directly to the tank shell, so all piping and connections are made outside the tank.

The Line Heaters are used as Suction Heaters to permit easier pumping of viscous oils; — or as Pressure Heaters, either to overcome temperature losses in long lines, or to preheat liquids for further processing.

In all cases the bundles consist of Brown Fintube hairpins rolled into the tube sheet in full compliance with the ASME codes. Metal bands, placed around alternate fintubes, prevent the longitudinal fins from interlocking and restricting the flow. This construction avoids baffling, and permits the liquids being heated to pass through the bundle *unobstructed*, in close contact with the fins and center tubes, with *low pressure drop*. Wide range of standard sizes.

Send for Bulletin No. 482. It gives full details.
Let us quote on your requirements.

Brown Fintube Hairpin Bundles Showing the Banding of Alternate Tubes that Eliminates Baffles and Assures Unobstructed Flow.



Hairpin Bundle Assembled in Shell Showing Mounting of Tube Sheet Between the Shell and Head.

THE BROWN FINTUBE CO.
ELYRIA, OHIO

FINTUBE HEAT TRANSFER PRODUCTS

ASHCROFT DURAGAUGE

"Progressive Research has meant continuous leadership for over 100 Years"

A few Ashcroft "firsts" that have anticipated the needs of industry:

1921—Ashcroft introduces the micrometer adjustable pointer.

1924—The rotary movement is announced by Ashcroft.

1929—The phenol condensate plastic case is an Ashcroft "first" this year.

1932—Bourdon Tubes of stainless steels are announced by Ashcroft research engineers.

1936—Stainless steel movements, for greater service life, join the long list of Ashcroft Gauge features.

1939—"K" Monel Bourdon Tubes, for services that would corrode stainless steel, introduced by Ashcroft.

1939—Laminated phenol dials make this year a big one in Ashcroft development.

1947—Ashcroft research engineers announce the new, revolutionary Nylon Movement*.

*Pat. applied for.

1850—A century of service to American Industry—1950

MAXWELL MANNING M&M E. MOORE INC. TRADE MARK

ASHCROFT *Gauges*

A Product of

MANNING, MAXWELL & MOORE, INC.

STRATFORD, CONNECTICUT

1850 ASHCROFT U.S.A.

Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' Industrial and 'Microsen' Electrical Instruments. Builders of 'Shaw-Box' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties.

OIC
PACE SETTER
IN VALVES

Engineered FOR LASTING SERVICE

200 LB. UNION BONNET BRONZE GATE VALVE

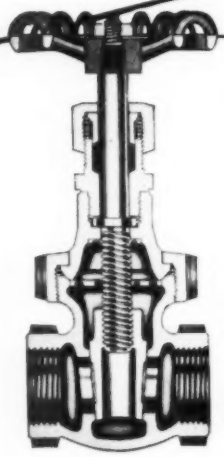
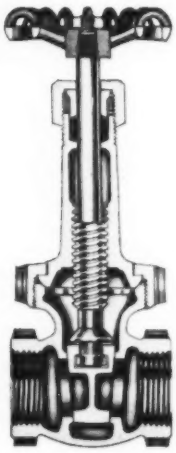


FIGURE NO. 7208 Non-rising stem, integral seat, OIC nickel alloy solid wedge, screwed end type.

FIGURE NO. 7200 Rising stem, integral seat, OIC nickel alloy solid wedge, screwed end type.



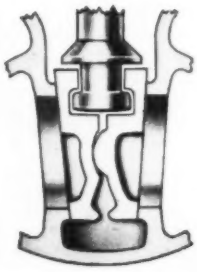


FIGURE NO. 7202 OIC Nickel Alloy double taper wedge automatically adjusts itself to its seat as valve is closed.

DESIGN: Solid wedge, rising stem; double-tapered wedge, rising stem; or solid wedge, non-rising stem. Integral seat, screwed end design.

BODIES: Of Steam Bronze ASTM B61, with average tensile strength of 40,000 lbs.

BONNETS: Also of Steam Bronze, with seal on lower end which mates with corresponding surface on stem to allow valve to be packed while fully open and under pressure. Condensing chamber below the stuffing box to keep packing cooler on high-temperature lines.

GATES: Of two types.

SOLID WEDGES are OIC copper nickel alloy, are of I-beam design, and reversible.

DOUBLE-TAPERED WEDGES fit into same bodies, but have ball and socket design, allowing wedge automatically to adjust itself to seat as valve closes. Accurately machined guides on both types, and tapered seating surfaces to give full contact with body seats as the wedges wear.

STEMS: Of manganese bronze, with double Acme thread for quick traverse of the wedge. Diameters sufficient to bear torsional loads greater than strongest hand pressure and to withstand severe operating conditions.

SEATING SURFACES: Machined to five-degree, self locking angle.

HANDWHEELS: Of ventilated malleable iron, finished in black enamel.

RATINGS: For steam at 200 lbs., 550 degrees F.; for cold water, oil, or non-shock gas service at 400 lbs. Shell tested at 500 lbs. and seat tested at 400 lbs.

SIZES: One-fourth inch to three inches currently available.

Special **INTRODUCTORY OFFER**

Check this 200-lb. Union Bonnet Bronze valve. Send us the size, and we'll deliver you a sample on memo billing. Keep it 30 days, take it apart, analyze it, test it. After you've examined all its superiorities, you may return it, if you wish, for full credit.

OIC VALVES

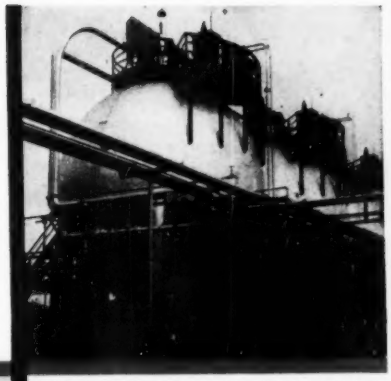
THE OHIO INJECTOR CO.
180 S. LYMAN ST., WADSWORTH, OHIO

BRONZE • CAST STEEL • FORGED STEEL • IRON

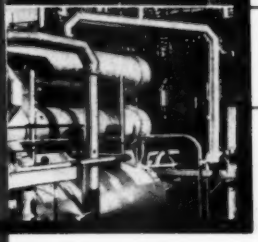
8-116-B

PETRECO DESALTING

consistently delivers a crude charge with minimum salt and solid content. A recent survey of all Petreco Desalters operating in oil refineries throughout the United States and Canada disclosed that Petreco Desalting was showing a very rapid pay-out in terms of improved refinery operations. It showed that:



THESE OPERATING ADVANTAGES	resulted directly in	THESE PROFITABLE ECONOMIES
Higher cracking temperatures.		*Deeper cracking, increased gasoline yield.*
Less plugging in furnace tubes.		*Fewer tube failures, higher charge rates.*
Reduced corrosion in overhead equipment.		*Less shut-downs due to mechanical failures.*
Less plugging in exchangers.		*Lower clean-out costs, more efficient heat exchange, longer runs.*



[redacted]

These are not the *only* benefits to be derived from Petreco Desalting – they are the benefits consistently enjoyed by the majority of Petreco users. For complete information on Petreco Desalting get in touch with the nearest Petreco office.

PETROLEUM RECTIFYING COMPANY

5121 South Wayside Drive, Houston 1, Texas
648 Edison Building, Toledo 4, Ohio
530 West Sixth Street, Los Angeles 14, Calif.

PETRECO

SPECIALIZED *Electric* PETROLEUM PROCESSES { DESALTING / DEHYDRATING

PR 50-1

Positive Eye Protection . . .

AO
F 9200
351A
Goggles

AO F-9200 ACETATE SPECTACLE GOGGLE

Very popular because of its lightweight comfort and good looks, the F-9200 of transparent, non-flammable *cellulose* acetate protects against particles striking from the front—and is available with acetate side shields when needed. End pieces are set high—out of the line of sight for unobstructed vision. Side shields are perforated for ample ventilation and fog retardance of lenses.

Other Features: Comfortable nose pads which evenly spread goggle weight . . . light but sturdy keyhole bridge . . . 6 Curve Super Armorplate orbit-shaped lenses for maximum protection and visibility. Clear or Calobar. Medium, dark or extra dark lens shades.

For Refinery Work

AO 351A AIR CONDITIONED GOGGLE

Oil producers, drillers, well diggers, maintenance men on refinery stills and others who work in hot and humid atmospheres or cramped quarters like the ample ventilation of the 351A. Extension rings supply nearly double the usual air flow and prevent fogging, while protecting against particles striking from any direction.

Individual eyecups are shaped to eye contour, fit snugly and are low set for wide-angle vision.

Other Features: Insulated ball-chain bridge—easily adjusted . . . one-piece, quickly adjustable, rubber headband . . . 50 mm (regular or 6 curve) Super Armorplate clear or Calobar lenses in medium, dark or extra dark shades.

For Field Work

American Optical COMPANY
Safety Products Division

Southbridge, Massachusetts • Branches in Principal Cities

When burning coke from header boxes and plugs, using pneumatic tools for turbining tubes, rolling tubes and heading up—for many jobs which require eye protection, AO Safety Goggles provide the maximum in safety and comfort. Order from your nearest AO Safety Products Representative.

New WHELAND TABLE TOP ROTARY

Model A-17—17½" Through Table · Model A-20—20½" Through Table

FACTORY "RUN-IN"

RUGGED

QUIET

PRECISION BUILT

EASY TO MAINTAIN

HIGH SPEED, OIL BATH ROTARY WITH RAISED GUARD FOR SAFETY

CUTS RIGGING UP TIME

BASE: Fabricated steel plate with cast steel center. Derrick floor easily fitted to box shape. Pipe can be stacked on top surface. Safe! Steel guard raised 1¾" above revolving table.

TABLE: Steel casting rotates on precision ball bearings in hardened and ground races that tcke both radial and thrust loads.

BRONZE TABLE BUSHING: Alemite lubricated. Prevents scoring of table.

GEAR AND PINION: Gleason spiral gear and pinion, standard equipment. Gears are shock resistant and perfectly lubricated to run smoothly, quietly.

PINION SHAFT ASSEMBLY: Removable as a unit for easy maintenance. Shaft is forged steel, precision machined, mounted on Timken bearings. Pinion locked at factory in perfect alignment with main gear for long trouble-free operation.

INBOARD AND OUTBOARD PINION SHAFT SEALS: In addition to new, improved mechanical seal, a positive type rubbing seal excludes all grit, sand, etc., from outboard bearing.

SUPERIOR LUBRICATION: Proper grade lubricant for each part assured by three separate, securely sealed oil compartments. Fill and check from top. Three separate oil pipes with bell reducers make it easy to add oil, separate automobile type dip sticks for checking oil level.

LOCKING DEVICE: Locking device is simple, positive. Engages ring gear, eliminates shock from pinion, shaft and bearing. Lock handle on top of table, convenient to driller.

SPLIT MASTER BUSHING: Cast steel. Takes A.P.I. Standard drive bushings. Master bushing alone or both master and drive bushings can be locked to table.

FULL MECHANICAL DETAILS ON REQUEST

NEW FEATURE

A recent modification on the New Wheland Table Top Rotary now provides eight sturdy built-in holds, one on each corner, to make this one of the world's easiest rotaries to pick up and move.

WHELAND

THE WHELAND COMPANY, CHATTANOOGA, TENN., U. S. A.

ROTARY DRILLING MACHINERY

DOMESTIC DISTRIBUTORS

Jones & Laughlin Supply Co.
Tulsa, Oklahoma
Stores and Offices in all Principal Oil Fields and Centers

EXPORT DISTRIBUTORS

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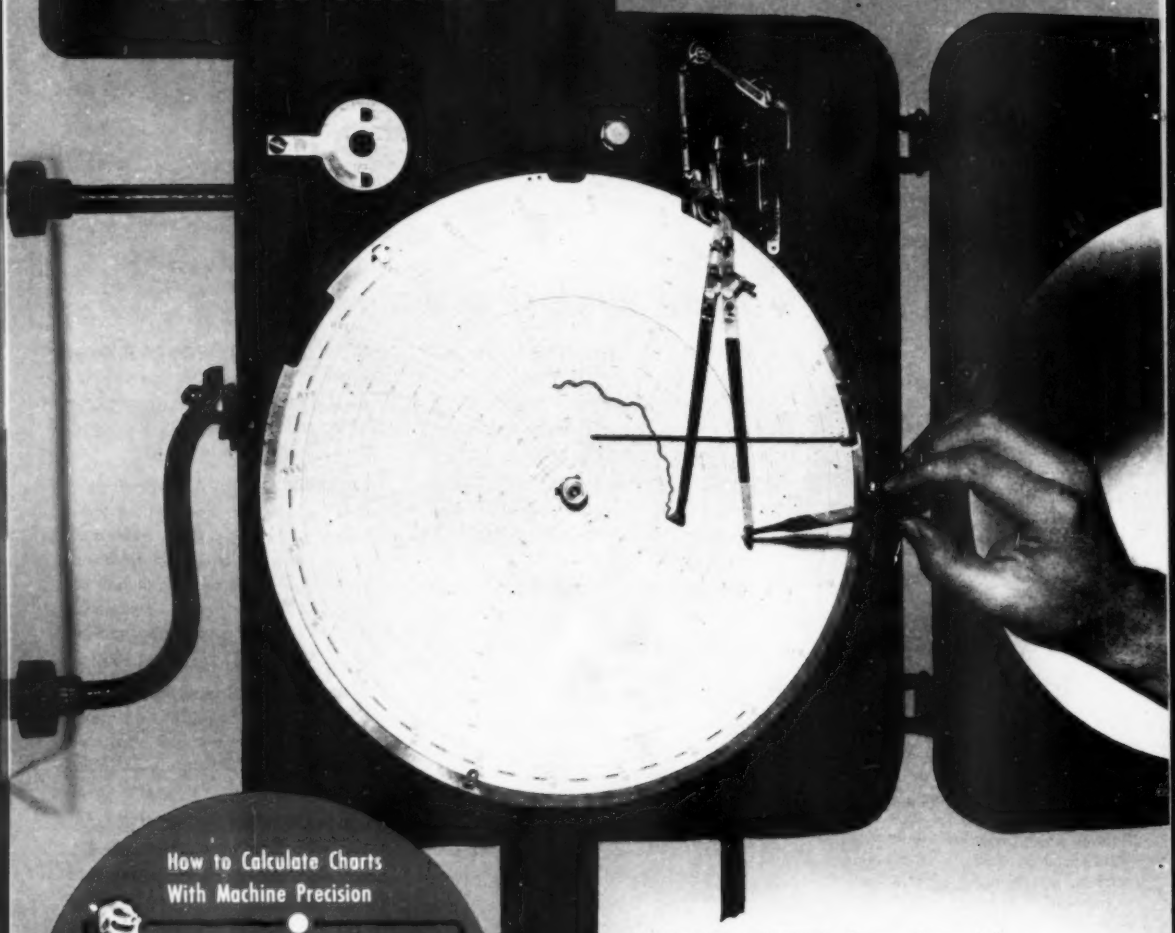
DRAW WORKS • SLUSH PUMPS • ROTARIES • SWIVELS • CROWN BLOCKS • TRAVELING BLOCKS

NO BLURRED OR MISSING RECORDS WITH Rockwell-Emco Orifice Meters



How to Calculate Charts With Machine Precision

This machine mechanically calculates the extension of various makes of orifice meter charts—up to 300 average charts a day. The extension appears as a total on a straight reading register. The operator traces colored lines over the static and differential records to verify results. Machine will duplicate in the office the accurate record made by the orifice gauge in the field. Write for bulletin 1016.

POSITIVE INKING does the trick

In the Rockwell-Emco design the chart moves in a counter clockwise direction from the underside of the pen to the top. This direction of movement in combination with a carefully projected pen angle tends to draw ink from the pens and feed it on the chart at uniform rate of flow. Blurred and missing records are eliminated by this positive method of inking. Here is just another advantage of using Rockwell-Emco orifice meters on all your services. Write for bulletin 1020.

Pittsburgh Equitable Meter Division
ROCKWELL MANUFACTURING COMPANY
PITTSBURGH 8, PA.

Atlanta · Boston · Chicago · Columbus · Houston · Kansas City · Los Angeles · New York · Pittsburgh · San Francisco · Seattle · Tulsa

Dr. F. M. Kannenstine, of Kannenstine Laboratories, has been designing seismograph instruments for 23 years. The Kannenstine Laboratories is an affiliate of Independent Exploration Co., where Dr. Kannenstine and his staff of scientists and technicians carry on continuous research to improve Independent's instruments as to sensitivity, fieldworthiness, and development of record character.

Continuing Instrument Research . . .

- means lower costs
- more accurate interpretation
- more complete coverage

for Clients of Independent Exploration Co.

As the search for oil reserves becomes more intensive the need for more effective, more efficient exploration methods becomes more vital. For 16 years, Independent has been a leader in the development of new instruments and advanced techniques . . . advancements that have directly resulted in many important discoveries. When you contract with Independent, you enjoy the advantage of the latest type equipment in the hands of experienced operators.

POINTING THE WAY IXC FOR THE DRILL

Independent
EXPLORATION COMPANY
Geophysical Surveys
ESPERSON BUILDING HOUSTON, TEXAS

SYMBOL OF

Low Cost Per Unit of Work

Whenever you see that Bethlehem reel, make a mental note. Remember it as a symbol of good wire rope and rope economy. That's what it means to thousands of users the country over. Sometimes they pay a little more for a Bethlehem rope, but this minor difference in first cost is more than offset by *lower cost per unit of work*—the only true yardstick of wire rope expense.

First cost—purchase price—can be highly deceptive as a measure of economy. The rope with the lowest price tag—offered as a "bargain"—may prove very costly in the long run. But this is a risk you do not take when you purchase Bethlehem wire rope.

Every foot of Bethlehem rope is quality merchandise, made carefully and conscientiously. When, after long service, a Bethlehem rope is finally retired, you will find that it has cost you very little for each unit of work it has done—for each drilling ton-mile, each yard of rock moved and loaded, each ton of coal hauled.

When you see a Bethlehem reel, let it remind you of all these things. Then, when it's time to order—order Bethlehem. You'll like the rope you find on that reel. It will serve you faithfully and well.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

IS YOUR SLIPPAGE SHOWING?

..Important question for users of reciprocating pumps and air or hydraulic cylinder mechanisms

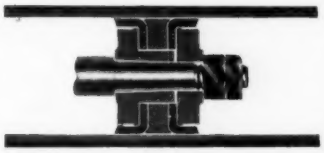
ILLUSTRATIONS at right show how Darcova Pumcups, in contrast to ordinary piston packing, virtually eliminate fluid slippage for the entire life of the packing. And, Pumcup life is many times that of ordinary packing.

By holding slippage to an absolute minimum, Pumcups permit reduced operating speeds, maintain high volumetric efficiency, prolong equipment life, save power, prevent wire-draw and uneven cylinder wear, and eliminate the need for frequent replacement shutdowns.

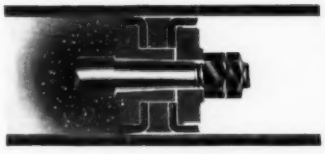
So if slippage is showing up in your operating and maintenance records . . . if replacement of packing is a too-frequent chore, that's your cue to switch to Darcova Pumcups.

For a free bulletin containing complete information, write, or use the coupon below.

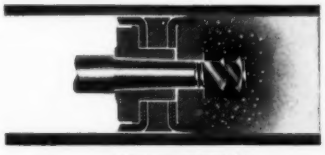
DIAGRAM OF PUMCUP ACTION GREATLY EXAGGERATED

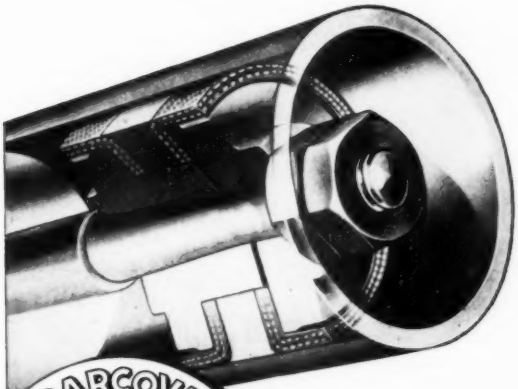


NORMAL: BOTH PUMCUPS RELAXED



UNDER PRESSURE: PUMCUPS SEAL AGAINST CYLINDER DESPITE WEAR, MINIMIZING SLIPPAGE





DARCOVA
THE ORIGINAL COMPOSITION CUP

DARLING VALVE & Manufacturing Co.
WILLIAMSPORT, PA.

Darcova Pumcups replace ordinary packing in reciprocating pumps and also in air or hydraulic control mechanisms. They are precision built of an exclusive, exceptionally durable composition material available in many textures for use with almost any fluid under a wide range of pressures and temperatures. Standard sizes range from ½ to 42 inches in diameter.

Darling Valve & Mfg. Co., Williamsport 1, Pa.

Please send me the free bulletin checked below:

☐ No. 4401... Darcova Pumcups for reciprocating pumps.

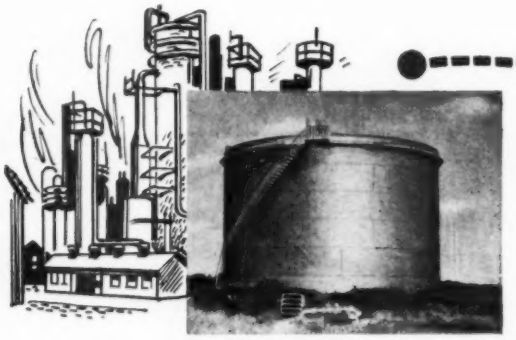
☐ No. 4502... Darcova Pumcups for air or hydraulic mechanisms.

NAME _____

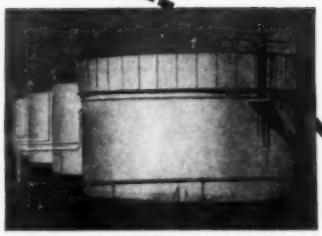
COMPANY _____

ADDRESS _____

CITY _____ STATE _____



Graver Floating Roof Tank . . . for sour crude oil storage . . . for finished petroleum products storage. Capacities from 5,000 barrels *up*.



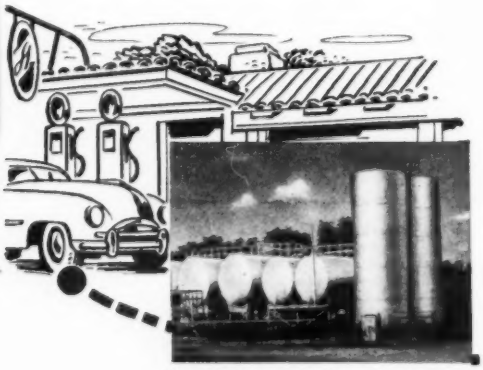
Graver Expansion Roof Tank . . . for vapor-saving storage of volatile products in single or multiple installations. Prevents breathing and filling losses. Capacities from 5,000 barrels *up*.

STORAGE . . . from start to finish by GRAVER

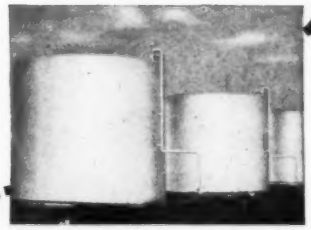
From oil field and refinery to bulk plant and service station . . . producers, refiners, and marketers are choosing Graver tanks for safe, economical storage of petroleum products. Make sure *you* have full facts and figures on the *complete* Graver line. Write for latest data.

Graverspheres . . . for storage of volatile liquids—butane, butadiene, etc.—and natural gasolines . . . for storage of gases. Pressures from 20 to 100 lbs. psi, or more. Capacities from 500 bbls. to 20,000 bbls.

Graver Pressure Tanks . . . for storage of propane, butane, etc. for all necessary pressures. Made in bullets (as shown) and spheroidal or cylindrical tanks. *Any* capacity.



Graver Bulk Storage Tanks . . . for storage of all finished petroleum products. Horizontal, vertical, or underground installation. Shop built. Capacities from 550 to 40,000 gallons.



Graver Cone Roof Tanks . . . for storage of oil, gasoline, kerosene, fuel oil, etc. Standard-API. All-welded construction. Field erected. Capacities from 50,000 gallons *up*.

GRAVER

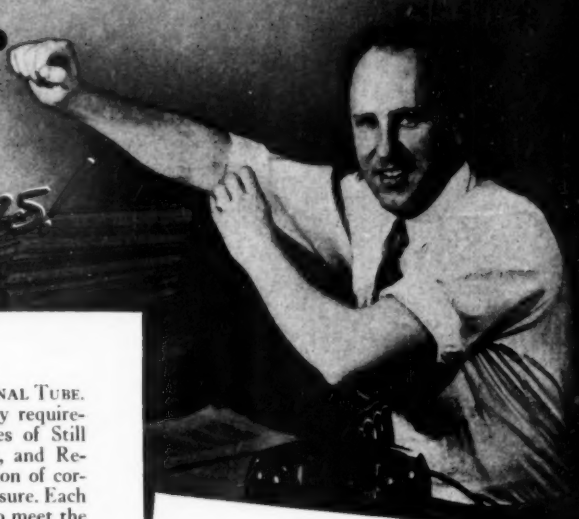
FABRICATED PLATE DIVISION

GRAVER TANK & MFG. CO., INC.

EAST CHICAGO, INDIANA

NEW YORK • PHILADELPHIA • CHICAGO • CATASAUQUA, PA. • HOUSTON • SAND SPRINGS, OKLA.

WE'RE READY TO HELP YOU LICK YOUR *Tubing Problems*



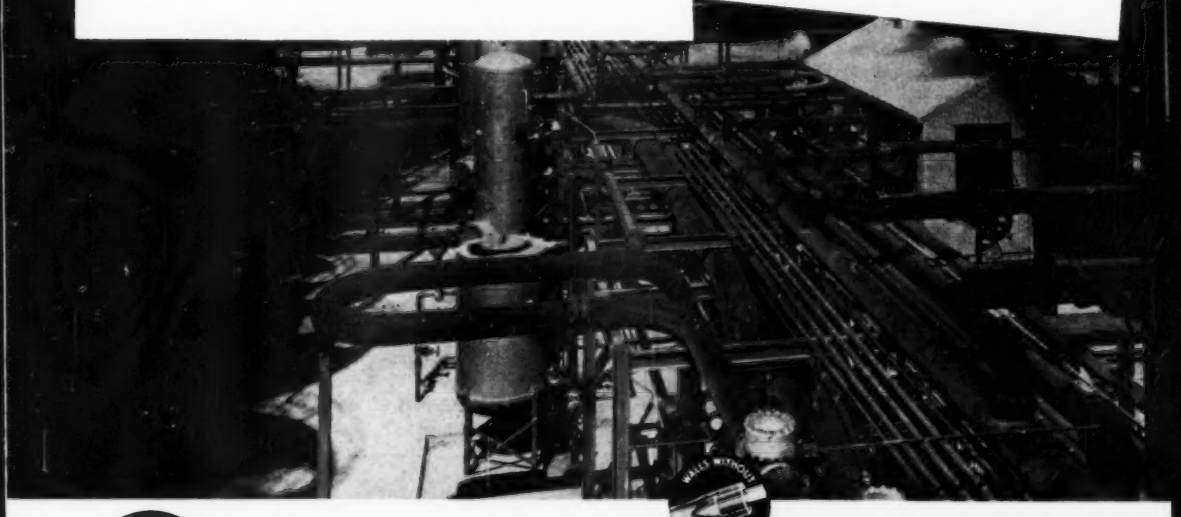
BRING your refinery piping problems to NATIONAL TUBE. As a result of long experience with refinery requirements, we have available 28 different analyses of Still Tubes, Condenser and Heat Exchanger Tubes, and Refinery Piping covering practically every condition of corrosion, oxidation, temperature, pressure and exposure. Each of these 28 different analyses has been proved to meet the specific condition for which it is recommended.

Yes, come to Tubing Headquarters. Tell us what conditions are at your plant . . . and what you expect of the pipe and tubing you buy. We'll check the information you provide against our large and ever-growing file of past problems involving similar conditions which have been successfully solved with NATIONAL Seamless Pipe and Tubes. The chances are we'll come up with a recommendation that will exactly meet your requirements . . . and save you a lot of time, trouble, and money! At any rate, it will cost you nothing to find out just what we can do for you!

NATIONAL TUBE COMPANY, PITTSBURGH, PA.
(Tubing Specialties Division)
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

28 DIFFERENT ANALYSES

- Low Carbon
- Low Carbon, ½ Moly.
- Low Carbon, 1 Moly.
- ½ Cr., ½ Moly.
- 1 Cr., ½ Moly.
- 1¼ Cr., ½ Moly.
- 2 Cr., ½ Moly.
- 2 Cr., ½ Moly., 1¼ Sil.
- 2¼ Cr., 1 Moly.
- 2½ Cr., ½ Moly., ¾ Sil.
- 3-Cr., ½ Moly., 1¼ Sil.
- 3-Cr., 1 Moly.
- 5-Cr., ½ Moly.
- 5-Cr., ½ Moly., 1½ Sil.
- 5 Cr., ½ Moly., Titanium
- 7 Cr., ½ Moly.
- 8 Cr., ½ Moly.
- 8 Cr., 1 Moly.
- 9 Cr., ½ Moly.
- 9 Cr., 1 Moly.
- 12 Cr., Aluminum
- 17 Cr.
- 27 Cr.
- 18-8
- 18-8 Titanium
- 18-8 Columbium
- 18-8 Molybdenum
- 25-20

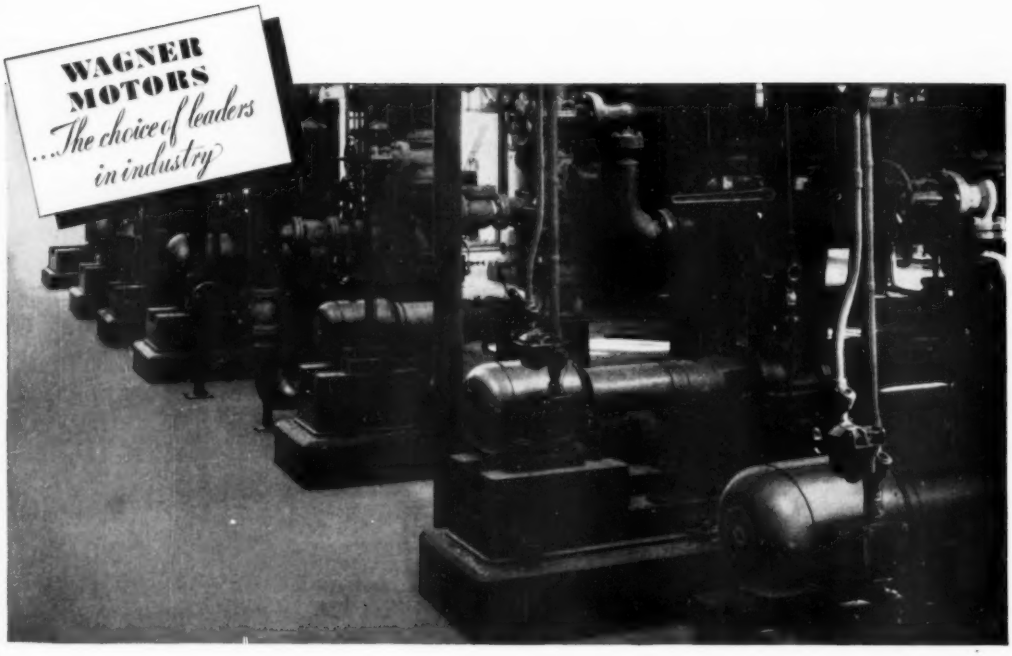


WELDS WITHOUT WELDS

USS

NATIONAL SEAMLESS PIPE AND TUBES

UNITED STATES STEEL



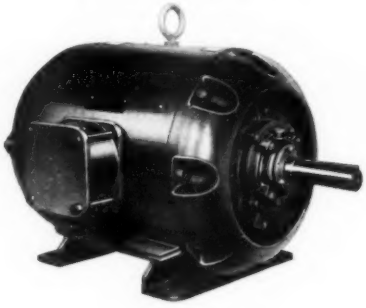
Wagner Explosion-Proof Motors Provide *Safe, Sure* Power for Refinery Pumps

The Wagner type HP Explosion-Proof Motors that power these pumps at a large Texas refinery are in continuous service 24 hours a day in an oil processing operation.

You'll find dependable Wagner type HP Motors on the job at major oil company plants throughout the world. There's a reason—type HP motors are especially designed to operate with safety and economy in surroundings where open-type motors might cause explosion. They are approved by Underwriters' Laboratories for Class I Group D hazardous locations . . . they are fully protected against adverse conditions so often found in oil fields . . . and they are always reliable.

If you need motors for use where explosive gases, fumes, vapors or combustible substances are present, investigate the safety and long life qualities of Wagner type HP Motors.

Twenty-nine branch offices, located in principal cities, are ready to help you whenever you have a motor problem. Users of Wagner Motors also profit by nationwide service facilities. Write for Bulletin MU-185 for information on the complete line of Wagner Motors.



Wagner Type HP Explosion-Proof Motor for hazardous location motor drives.

WAGNER ELECTRIC CORPORATION
6389 Plymouth Ave., St. Louis 14, Mo., U.S.A.

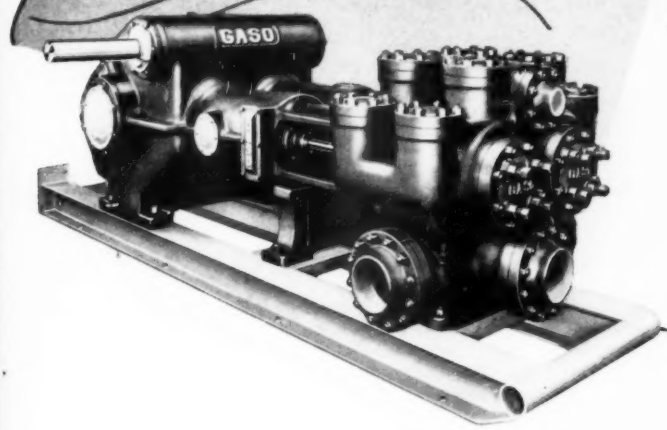
Wagner Electric Corporation
EST. 1891

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

BRANCHES IN 29 PRINCIPAL CITIES

GASO PUMPS

In tune with the times

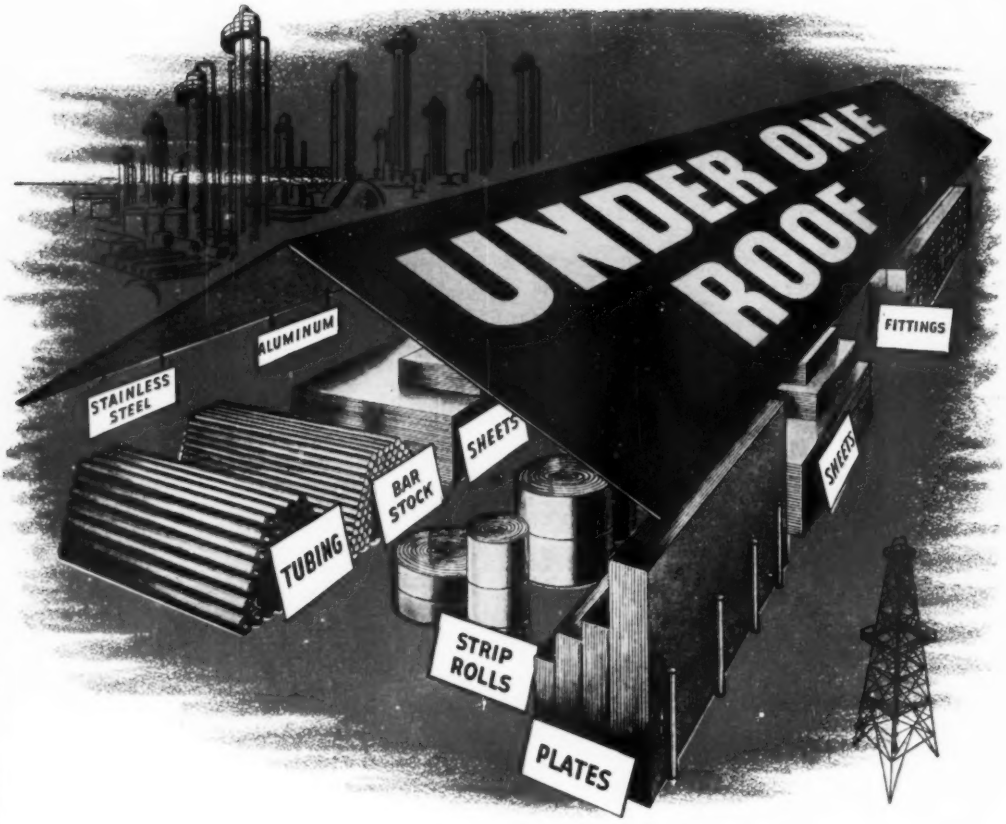


The tempo of business today is an urgent call for new levels of efficiency in all departments of operation . . . Gaso's history is a record of complete harmony with this demand . . . Company after company has standardized on GASO Pumps because their cost figures show that GASO Pumps deliver completely dependable performance for longer periods of time and with less attention . . . Gaso engineering, backed by over 33 years' experience, is directed to the one job of meeting the special needs and conditions of the oil industry . . . Gaso's best "salesmen" have always been the cost record of its customers. Write for catalog.

GASO PUMP & BURNER MFG. CO.

TULSA, OKLAHOMA, U. S. A.

Export Office: 149 Broadway, New York. Shreveport and Odessa: W. L. Somner Co.
Los Angeles: Production Equipment Co., Inc. 651 E. Gage Ave.



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"One-call service... for on-call metals"

Geared to industry's continuous demand for specialized metals, Metal Goods' one-call service is designed to make your metal procurement easier — and more efficient. By having the metals you need "on-call" from your Metal Goods warehouse — *when* you need them — you can eliminate costly metal inventories... save storage space... reduce materials handling... and gain efficiency through simplifying your supply effort.

Metal Goods warehouses are strategically located to serve you quickly and dependably. Sheets, Plates, Tubes, Bars, Fittings and Accessories of... **STAINLESS STEELS ALUMINUM • BRASS • COPPER • MONEL* • NICKEL* • INCONEL***

Plus... complete stocks of Condenser and Heat Exchanger Tubes... Admiralty... "Alclad" Aluminum... 70/30 Super-Nickel, Monel.

Tube Sheets... Naval Brass... Muntz Metal

Fittings and Accessories

Consult your Metal Goods metallurgical specialist on the proper metal for your application.

*Not warehoused in Kansas City or St. Louis

Phone, wire or write your Metal Goods warehouse for your specialized metal needs.

Do you have the "Metalog"? It's a complete stock list and metal manual — Write for it!

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Now...A Car Built for Oil Country

Gets You There When Others Can't!

The New
4-Wheel-Drive

Jeep
PRODUCT
WILLYS-OVERLAND

WILLYS
Station Wagon

Here's the kind of a car oil men have always needed—a full-size car, with an all-steel body, that travels the roughest oil country and takes you through places too tough for ordinary cars!

The rugged 4-wheel-drive of this new Willys Station Wagon gives you all-wheel traction, ability to get through to hard-to-reach locations, even when mud, snow and ice takes over the country.

This car is built on a newly engineered 4-wheel-drive chassis with a sturdy steel girder frame, 104" wheelbase. It's roomy and comfortable, with seats for six . . . plus space in the rear for a big load of tools and equipment. It is highly maneuverable, has ample road clearance and flat, open, dent-resisting fenders.

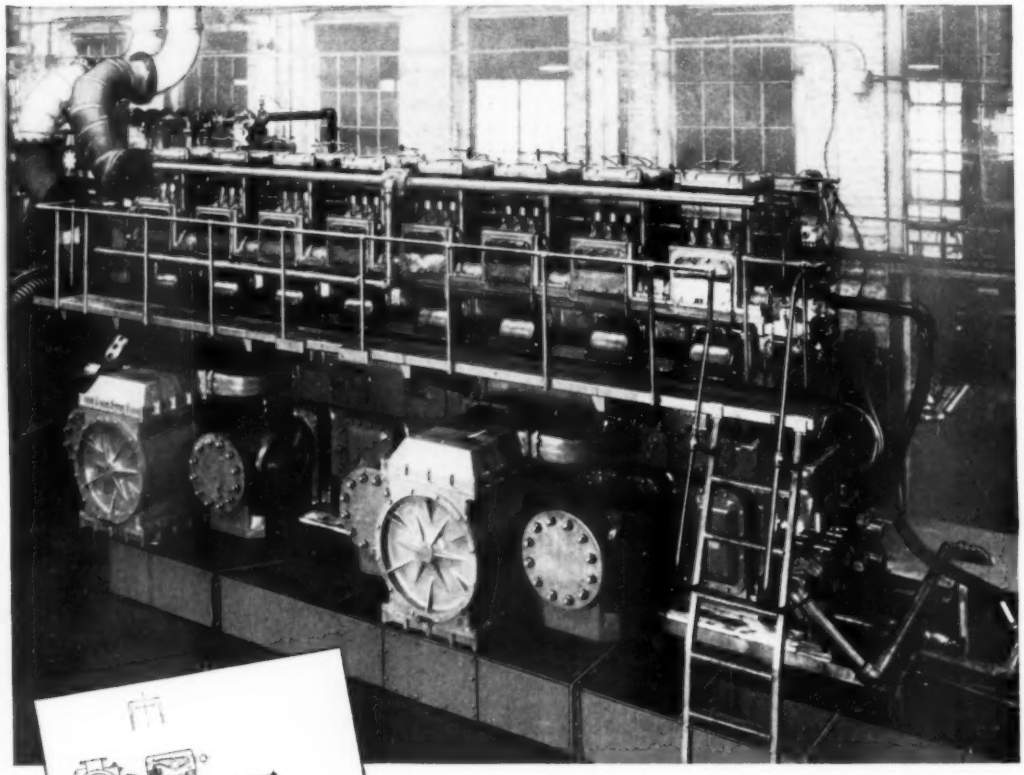
See this great oil country car now at your Willys-Overland dealers.

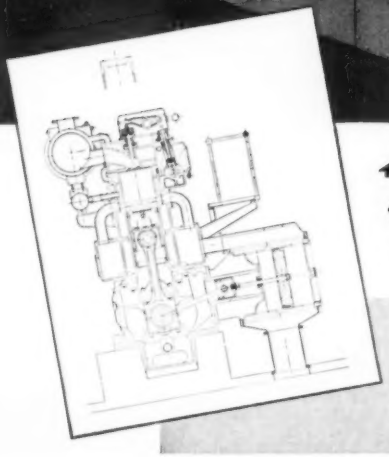
YEAR 'ROUND TRANSPORTATION over deep-rutted lease roads or through roadless areas is assured with the 4-Wheel-Drive Willys Station Wagon. You shift to conventional 2-wheel-drive for level ground and hard roads.

HAULING CAPACITY can be easily increased to 98 cu. ft. of load space by removing rear seats. With the end gate down you have a flat bed 8½ feet long. Seats and interior are washable!

WILLYS-OVERLAND MOTORS, TOLEDO 1, OHIO • MAKERS OF AMERICA'S MOST USEFUL VEHICLES

BRAND





A uniflo UTC-16 on the test block.

Section through engine and scavenging pump, showing 360° intake ports and the mechanical exhaust valves.

WORTHINGTON

NEW...

and 11 ways better!

Worthington Achieves a Triumph in Modern Angle Gas Engine Compressor Design with the Uniflo TYPE UTC-16's...Thru-Scavenging, 2-Cycle Engines of 800—2,000 HP that Hit New Highs in Efficiency AND Economy...Outstanding on Pipeline Duty

1. UNIFLO SCAVENGING — A RADICAL IMPROVEMENT OVER CONVENTIONAL LOOP SCAVENGING.

AIR PORTS AROUND ENTIRE CIRCUMFERENCE OF CYLINDER. Port area more than double.

EXHAUST THRU CAM OPERATED TIMED VALVES IN CYLINDER HEAD. Area 50% greater.

STRAIGHT LINE AIR FLOW thoroughly cleanses and cools entire cylinder.

SUPERCHARGING. Timed valves retain greater weight of pure air for perfect combustion.

THESE IMPROVEMENTS result in higher mean effective pressures without increased temperatures.

2. EN BLOC FRAME—permits use of removable cylinder liners.

3. DOUBLE AIR MANIFOLDS—doubles volume of air and steadiness of flow.

4. RENEWABLE CYLINDER LINERS — mean longer life and low-cost maintenance.

5. PISTON—completely symmetrical outer piston wall — wrist-pin supported in separate carrier.

6. CYLINDER HEAD — Worthington cone-type ... two large exhaust valves — streamlined passages.

7. GEAR DRIVEN CAMSHAFT—assures positive drive and perfect timing.

8. IMPROVED COOLING — jacket water space cast integral with liners, eliminating internal water seals.

9. LUBRICATING SYSTEM—Worthington cast-in manifolds, positive pressure lubrication to every running part.

10. ACCESSIBILITY — inherent in straight-line engine design, increased by large access doors on both sides of the engine frame.

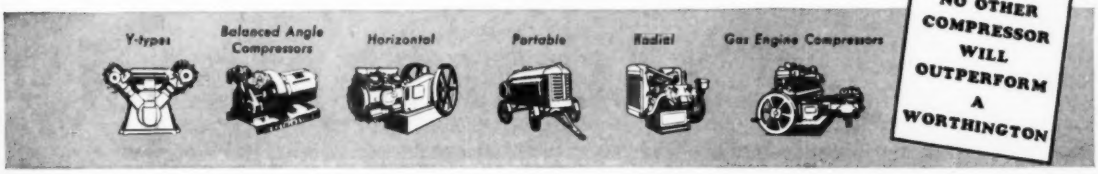
11. WORTHINGTON FEATHER* VALVES: lightest, tightest, quietest ever made used in both compressor and scavenging cylinders.

"CUSTOM-BUILT" FOR ITS JOB

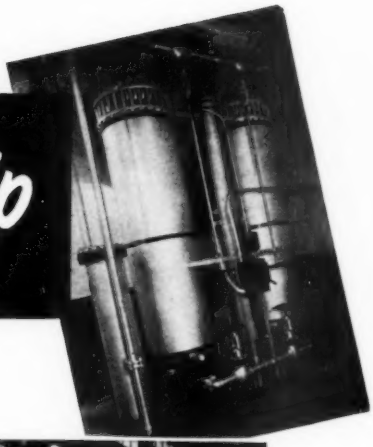
In addition to Worthington's experience covering half a century of building compressors for pipeline duty, more than seven years of intensive research devoted to developing the uniflo scavenging principles have gone into producing the TYPE UTC-16. The result is an Angle Gas Engine Compressor that meets the rigid requirements of gas pipeline service with more efficient use of fuel, cooler operation, improved accessibility and longer service life. For further facts about the uniflo TYPE UTC-16 — and proof that here, again, *there's more worth in* WORTHINGTON — contact your nearest Worthington Branch Office or the *Worthington Pump and Machinery Corporation, Engine Division, Buffalo, N. Y.*

*Reg. U. S. Pat. Off.

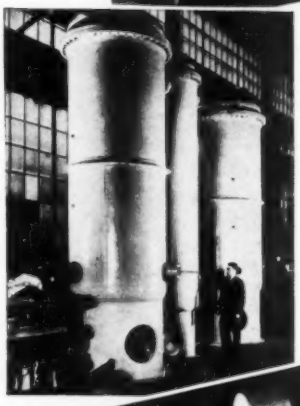
EK.0.1



Here's DRYing help



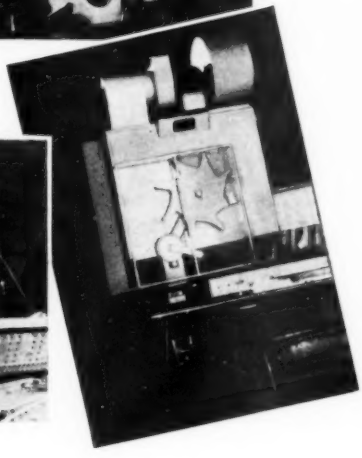
FOR PLANT DESIGNERS AND BUILDERS



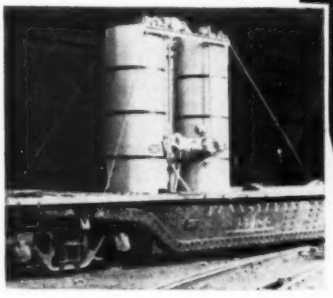
Do your processes call for DRYing operations? Just note the quantities involved, the dewpoints to be reached, and the materials to be handled—air, gases or organic liquids. Then get in touch with Lectrodryer for prompt recommendations on equipment to do that DRYing.

No need for your engineers to take time to design and supervise construction of special, untried machines. Quite often, the drier you need is a standard Lectrodryer, ready to step out of our catalog into your plant; special machines are "tailored" from time-proven parts. Thousands of Lectrodryers, in service all over the world, are evidence of their dependability.

Lectrodryer engineers have been assisting in solving DRYing problems ever since 1932. Draw on this wealth of experience whenever your design and construction work carries you into this very specialized field of dehydration by adsorption. We can probably save you money as well as time.



Send your inquiries and requests for our general catalog to Pittsburgh Lectrodryer Corporation, 325 32nd Street, Pittsburgh 30, Pennsylvania.



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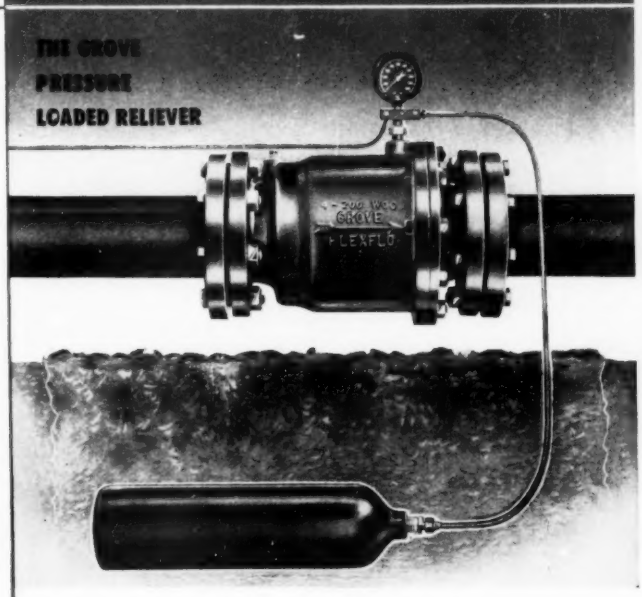
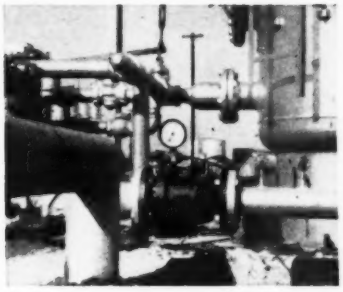
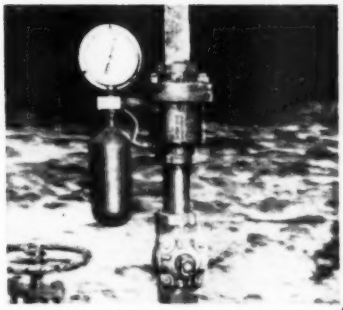
POSITIVE ACTION
BUBBLE-TIGHT SHUT-OFF
LONG SERVICE LIFE

YOU NEED

THE GROVE
PRESSURE
LOADED RELIEVER







The Grove Flexflo Pressure Loaded RELIEVER is appearing all over the oilfields. Oil men are beginning to discover its flexibility —its adaptability as either a Relief Valve or Back Pressure Regulator on constant or intermittent flow. Incorporating all the outstanding features of the Grove Flexflo, the Model 888 gives instant response to the smallest line pressure variation. The rubber-tube is smooth and positive in action, eliminating seepage and leakage . . . offering sure and certain operation when installed in parallel with code-required relief devices.

For ground-insulation against temperature changes, the pressure cylinder can be buried: Where pressure variations due to temperature changes are not important, the cylinder may be attached directly at the Flexflo for ease of installation and maintenance. Self-contained and self-operating, the Grove RELIEVER will give years of satisfactory service, opening and closing thousands of times with no sticking or chattering, no troublesome operation or maintenance problems. Write for full details and application data today.

GROVE
SIMPLICITY ACCURACY SAFETY

GROVE

FLEXFLO
"PUTS PRESSURE TO WORK"

PRESSURE LOADED
RELIEVER

GROVE REGULATOR COMPANY • *65th & Hollis Street, Oakland 8, California*

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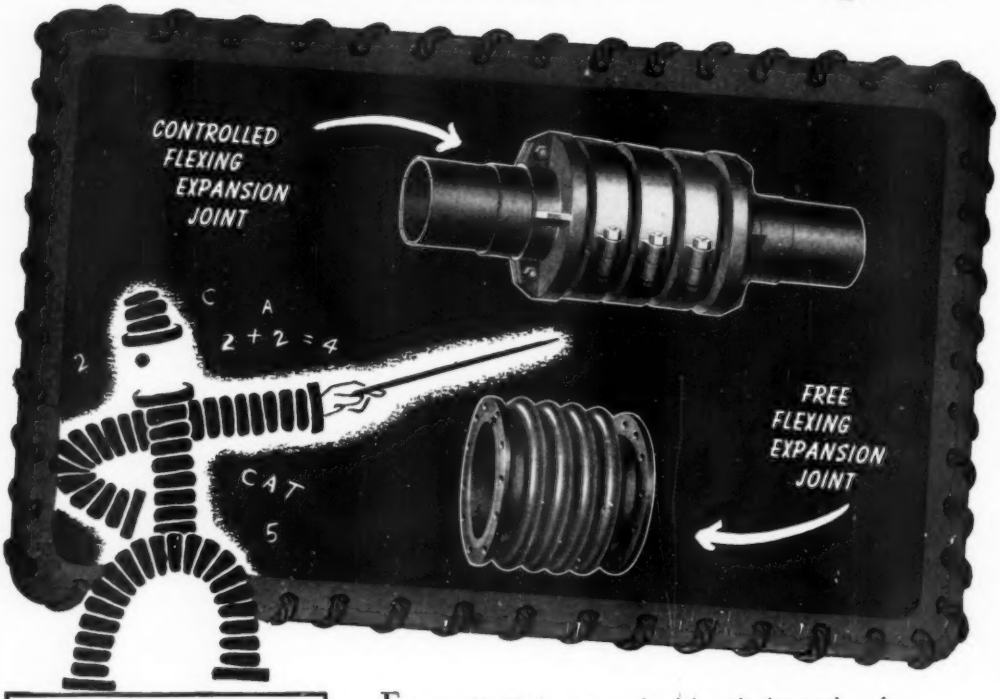
Let CMH simplify expansion control for you



CMH FREE-FLEXING EXPANSION JOINTS for pressures to 30 psi.; temperatures to 1400° F. Sizes to 24" I.D. Flanged or welding ends.

CMH CONTROLLED-FLEXING EXPANSION JOINTS with precision mated control rings for pressures to 300 psi.; temperatures to 1400° F. Sizes to 24" I.D. Flanged or welding ends.

CMH FLEXONIFLEX EXPANSION JOINTS for pressures in the 1000 psi range can be furnished. Recommendations will be made on receipt of installation details.

For most installations, expansion joint selection need not be a complicated task. CMH has reduced the expansion joint selection problem to a matter of charts from which the joints necessary to meet your requirements may be selected quickly and easily. For unusual installations CMH offers its "Engineered Application Service" in which competent piping specialists will analyze your problems and make recommendations.

Whether your requirements are "run of the mine" or "one in a million" . . . for a new installation or replacement of obsolete equipment . . . CMH will make it easier for you to get the *right* expansion joint.

CMH—ONE dependable source
for every flexible metal hose requirement

• CMH manufactures all standard types of flexible metal hose, both convoluted and corrugated, in a variety of metals; expansion joints for piping systems; stainless steel and brass bellows; various conduits and special assemblies of these components.

CHICAGO METAL HOSE CORPORATION
EXPANSION JOINT DIVISION

Leaders in the Science of Flexonics
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FLEXON . . . . . identifies CMH products which have served industry for more than 48 years

MONEY $ MAKERS on Workover Jobs

Bucyrus-Erie Spudders

$ In field after field Bucyrus-Erie spudders have proved that they're the modern mobile way to make workover jobs pay. Thousands of owners will tell you that you can't beat these fast moving, fast working, easy-to-rig-up machines for bringing in profits on clean-out, deepening, redevelopment and other workover jobs. Here's why:

HANDLE MORE JOBS EACH YEAR. With semi-trailer or skid mountings, Bucyrus-Erie spudders have the outstanding mobility which permits traveling at normal highway speeds from job to job. Telescoping derricks make quick and easy set-ups. Fast hoisting speeds save time in handling tools, bailer, casing, tubing and rods.

HANDLE EACH JOB MORE EFFECTIVELY. Two forward speeds and quick reverse on all drums (except 24-L) give accurate split-second control; big capacity and ample power make tough workover jobs easy; convenient arrangement of levers keeps the operator in direct control at all times, eliminating waste motions. Your Bucyrus-Erie distributor will give you detailed information on the complete line of Bucyrus-Erie spudders — they're "money-makers" on drilling, tailing-in, and other operations, too.

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63649

See or Write Your BUCYRUS ERIE Spudder Distributor

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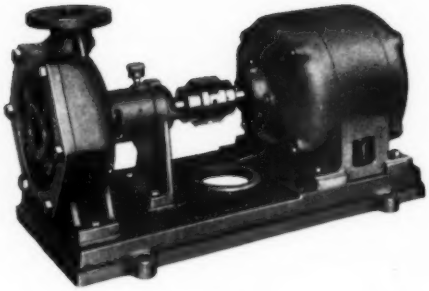
Transit Type CS Pumps

FOR CHEMICAL, PROCESSING AND GENERAL SERVICES



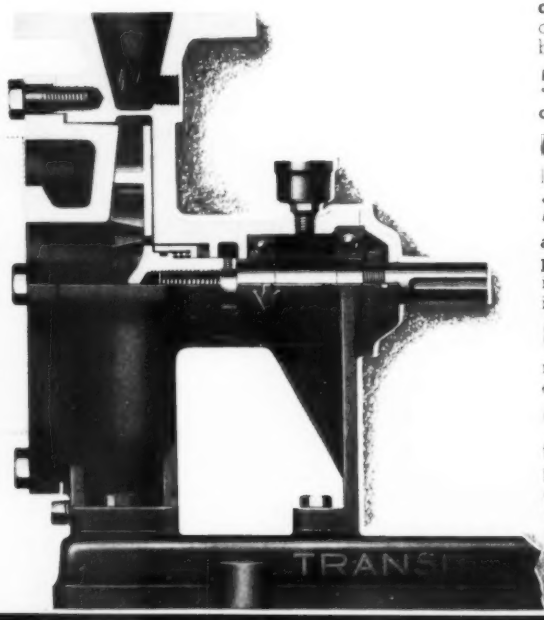
Max. working pressure 200 ppsi, 200°F., 150 lb. Flange Drilling.

Capacities up to 550 G P M, differential heads to 160'.

Designed to give maximum strength, dependability, efficiency, and simplicity at minimum cost.

Ask for Bulletin 6100.

For Higher Pressures, Capacities and Temperatures, ask for Bulletin 6000, Transit Type ES.



COMPARE THESE FEATURES

1 **A balanced mechanical seal** which can be repaired from impeller end without making any precision measurement and without disturbing the shaft, bearings, coupling, driver, or discharge piping.

2 **Supported directly under the case** for maximum strength and freedom from piping strains.

3 **Case and bearing bracket are one integral casting** of the same metal for maximum strength, true alignment and 100% corrosion protection.

4 **No threads, and minimum number of parts exposed to the line fluid.** All parts can be furnished in any metal or alloy which can be cast and machined.

5 **Totally enclosed stainless steel clad case gasket** which can be reused many times.

6 **Extra heavy cases and impellers** for liberal corrosion and erosion allowances.

7 **The least number of parts per pump and the maximum interchangeability of parts between sizes.** Six sizes with all parts interchangeable except case, end cover and impeller.

8 **Extra heavy shaft and bearings** with running clearance easily adjusted for maximum efficiency.

9 **Discharge nozzle** is vertical and is located at center of pump for venting and to simplify piping.

10 **Minimum floor space** required.

NATIONAL TRANSIT PUMP AND MACHINE CO.

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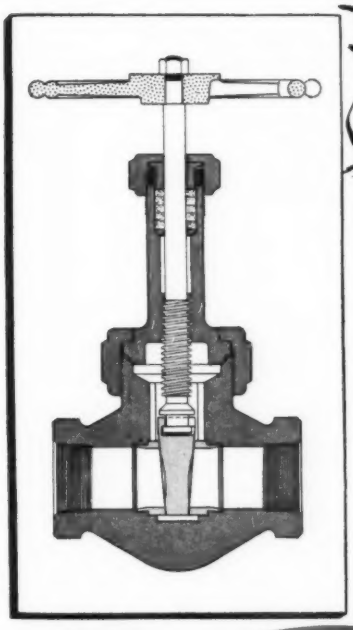
"This time use top quality forged steel 600# gate valves for that hot spot"

"That's easy we'll order VOGT Series 5300" *



Here are valves that will stay on the line longer and require little maintenance year after year because toughness and durability are built into them right from the start.

Series 5300 valves have drop forged steel bodies and bonnets, rolled-in 11½-13% chrome stainless steel seats which can be easily renewed, and solid stainless steel wedges. A ground joint insures tightness between the body and bonnet. The stuffing box can be repacked under pressure when valve is fully open.

Series 5300-F8 valves with 18-8 stainless steel trim and Series 5200 valves with Monel Metal trim are also available.

***Series 5300**

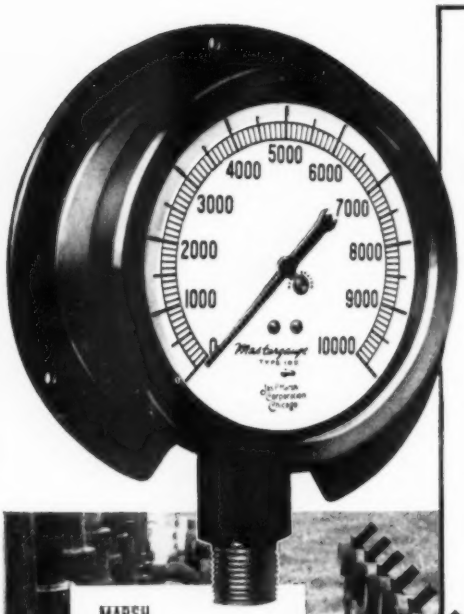
CARBON STEEL { 600 Pounds @ 800° F. / 2000 Pounds Cold Non-Shock

For 600 pound service • Union Bonnet Ground Joint • Inside Screw Stem • Renewable Seat Rings • Solid Wedge — Slotted Type • 11½-13% Chrome Stainless Steel Trimmings Sizes ¼" to 2" inclusive.

HENRY VOGT MACHINE CO.
Louisville 10, Ky.

BRANCH OFFICES: NEW YORK • PHILADELPHIA CLEVELAND • CHICAGO • ST. LOUIS • DALLAS

Vogt DROP FORGED STEEL VALVES



It begins where other gauges leave off-

The now recognized ability of the Marsh Mastergauge to do a better job for more years is a direct result of setting out to design and build an instrument possessing accuracy, precision, and stamina beyond any gauge that had ever been produced.

Try the Mastergauge where other gauges have failed — under the gruelling conditions of extreme temperature, heavy pulsation, racking vibration — conditions that wreck the ordinary kind. You will find that it truly begins where others leave off.

We can say this today without fear of contradiction because Mastergauge has *said it for itself* . . . in thousands of applications throughout the oil country.

And remember: The toughest gauge to knock *out* of adjustment is the easiest gauge to get back *in* adjustment . . . thanks to the exclusive "Marsh Recalibrator."

Ask your supply store, or write us, for Marsh Oil Industry Bulletin.

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Sales affiliate of Jos. P. Marsh Corporation
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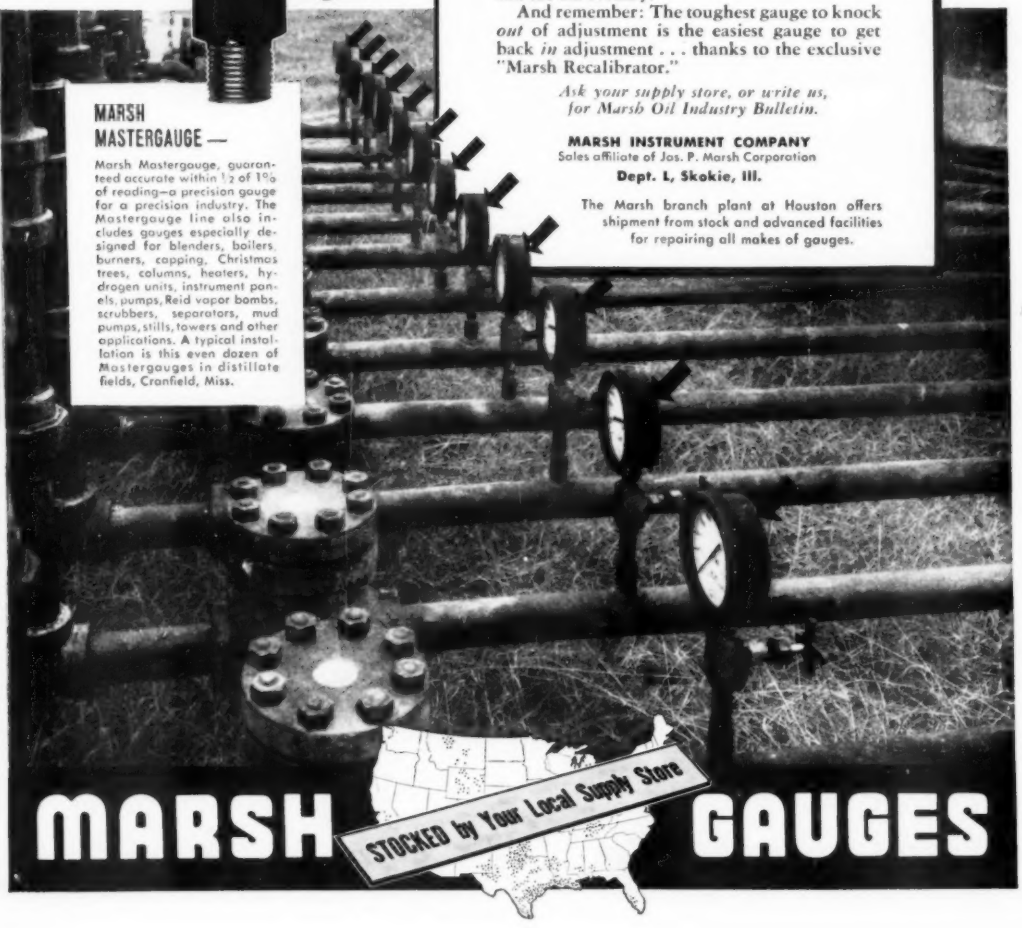
The Marsh branch plant at Houston offers shipment from stock and advanced facilities for repairing all makes of gauges.

MARSH MASTERGAUGE —

Marsh Mastergauge, guaranteed accurate within ½ of 1% of reading—a precision gauge for a precision industry. The Mastergauge line also includes gauges especially designed for blenders, boilers, burners, capping, Christmas trees, columns, heaters, hydrogen units, instrument panels, pumps, Reid vapor bombs, scrubbers, separators, mud pumps, stills, towers and other applications. A typical installation is this even dozen of Mastergauges in distillate fields, Cranfield, Miss.



MARSH **STOCKED by Your Local Supply Store** **GAUGES**

KONTOL

Protects pumping equipment against corrosion

Does not complicate field demulsification

Does not deposit precipitates

Kontol Corrosion Preventive was developed by the Tretolite Company to help producers combat the high cost of corrosion damage. Kontol protects pumping equipment – rods, pumps, tubing, casing and flow lines – by adsorbing to the metal surfaces of this equipment. The adsorbed Kontol film resists attack by corrosive elements, and prolongs the useful life of costly production equipment.

For literature, information on the Kontol rate of corrosion test, or other particulars write to or call

FIELD-TESTED
EASY TO USE

KONTOL

CORROSION PREVENTIVE

A product of the

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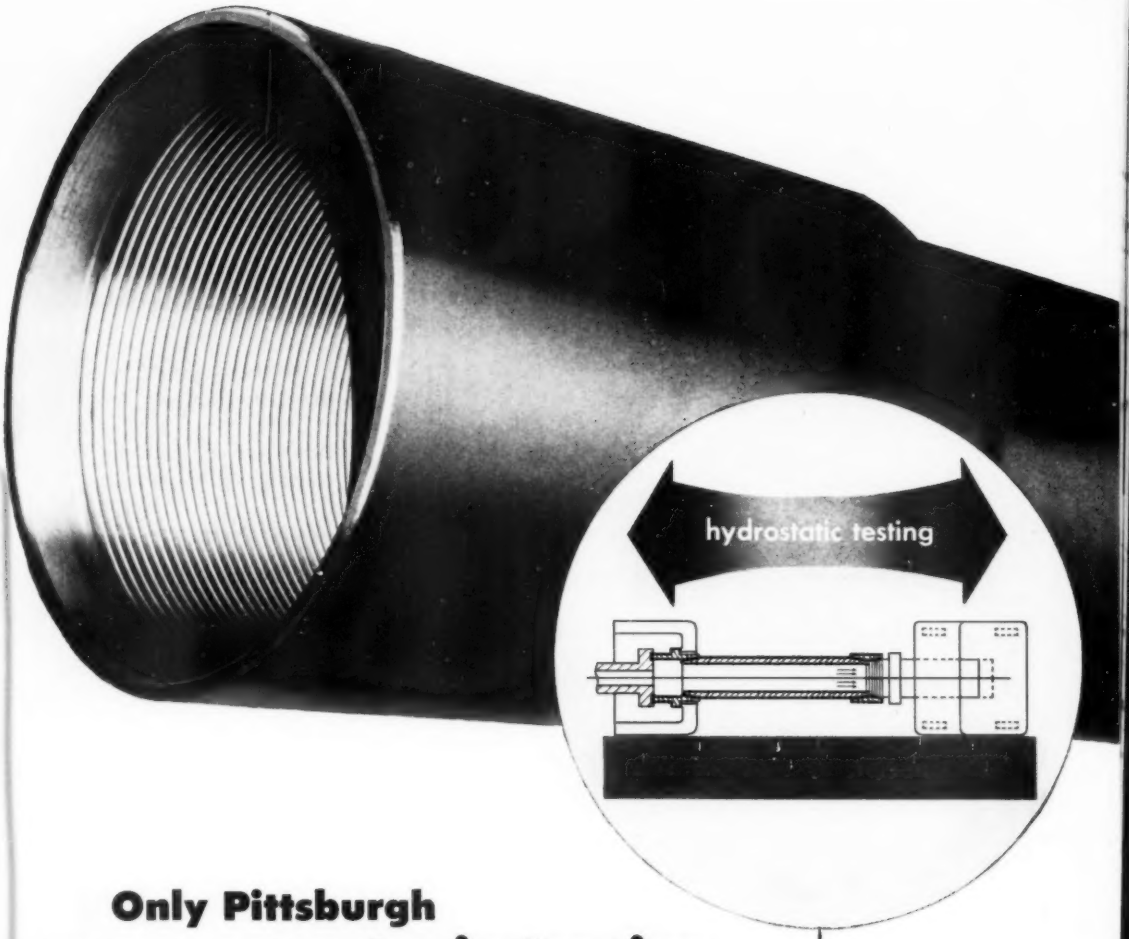
CHEMICALS FOR THE PETROLEUM INDUSTRY

Corrosion Inhibition • Dehydrating
Desalting • Water De-oiling
Scale Prevention • Paraffin Removal



Only Pittsburgh can test your casing in tension for extreme depths

With Pittsburgh Seamless Casing *tested in tension* up to 10,000 psi you have extra protection against failure—greater security at high pressures. The Hydrostatic Tension Testing method was originated by Pittsburgh Steel and is today the only manufacturer capable of testing in this manner up to 10,000 psi. This extra value you get from Pittsburgh Seamless Casing is typical of the quality you get in all Pittsburgh Oil Country Tubular goods. It will pay to specify them on your next order. Ask your Pittsburgh field engineer for full particulars or write to Pittsburgh Steel Company, Dept. OG, Pittsburgh 30, Pa.

Pittsburgh Seamless Casing

a product of

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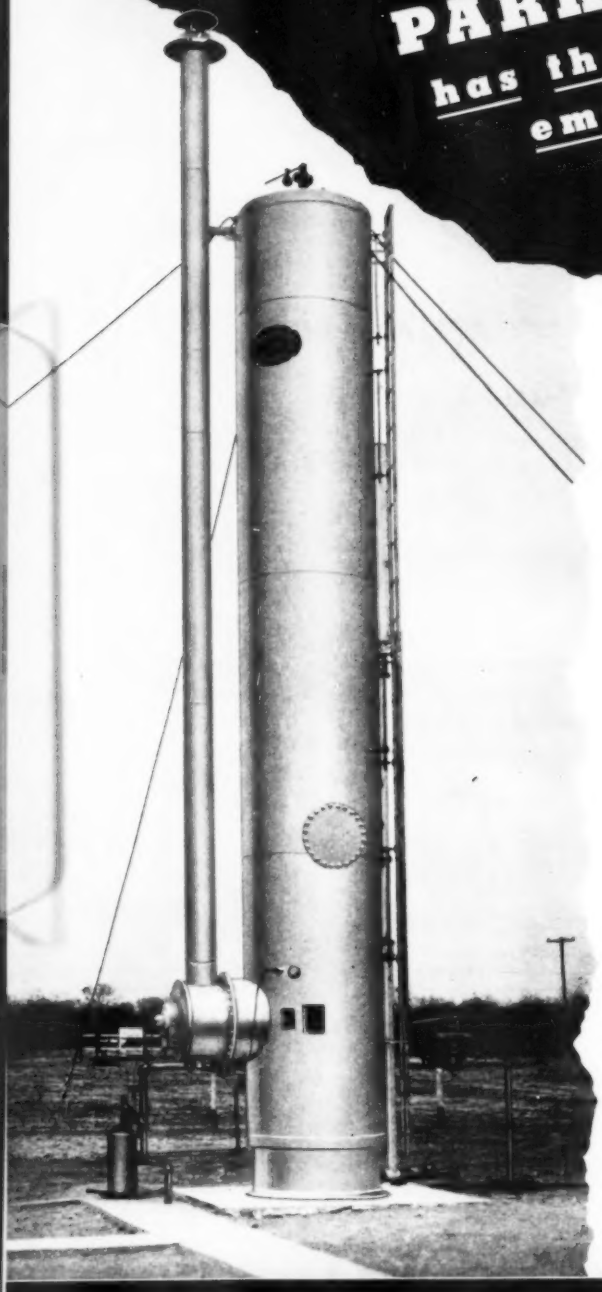
PARKERSBURG has the answer to your emulsion treating problems



WHETHER yours is a common emulsion treating problem or one that is extremely rare and complex, there is a Parkersburg treater of the proper type and size for maximum efficiency.

The new ETSI series, with its famous fourteen features, is available in four types and 15 sizes. The ET series, perennial leader of the industry, is available in two types, four sizes.

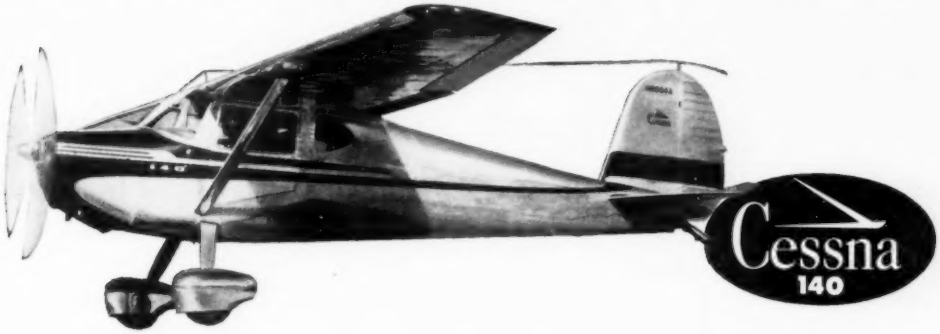
It will pay you to bring your treating problems to emulsion treating headquarters. Parkersburg engineering experience in the solution of scores of such problems . . . their manufacturing facilities for the production of a wide range of treaters is your best assurance of emulsion treater efficiency.

Talk to your nearest Parkersburg representative before specifying your next emulsion treater. Write for Treater Catalog ET-249 giving complete construction and operating details.

THE PARKERSBURG RIG & REEL CO.
PARKERSBURG, WEST VA.

PARKERSBURG

★ SEE THE NEW 1950 CESSNAS—NOW AT YOUR CESSNA DEALER'S ★



Cessna "All-Metal Engineering"

BRINGS YOU TODAY'S GREATEST 2-PLACE AND 4-PLACE VALUES!

CESSNA 140: A roomy, 2-place, *all-metal*, cross-country plane . . . now even more beautiful and more comfortable. New, comfort-engineered seats—even better visibility—less cabin noise.

Compare this new Cessna 140 with *any other* 2-place plane . . . *on any basis.* For example, efficiency formulas all over the country show it delivers more miles per gallon—more speed—more range. Try it yourself on a tough traveling schedule. You'll discover that on an average 1000-mile trip in the U. S. your Cessna 140 will be within an hour of the DC3 airline schedule. And you'll be able to go *where* you want *when* you want . . . to arrange your schedule to suit yourself.

Can your business afford not to buy the money-saving transportation—the extra convenience and comfort—the extra mobility this new Cessna 140 offers? ARRANGE TODAY FOR A PRACTICAL TEST. Your nearest Cessna dealer will be glad to help you.

CESSNA 170: The famous "Family Car of the Air" . . . With new streamlining, new convenience, new comfort! Luxurious interiors with plenty of room for *four* large men and their luggage.

Analyze what this airplane will do for you and your business: Over 120 m.p.h. cruising speed! Over 500 miles comfortable range on a filling of gasoline. (You'll get over 15 miles per gallon—and you can go that mileage-saving direct route.) You and your men can go *where* you want—*when* you want—FAST! And you can take associates and customers with you. What would this be worth to your company in a month, or a year? Why not arrange for a practical test with your Cessna Dealer? This new Cessna 170 costs literally thousands of dollars less than any other 4-place, all-metal plane on the market!

THERE'S A CESSNA THAT FITS YOU *AND* YOUR POCKETBOOK!
Arrange Today for a Practical Test

ALSO SEE the Cessna 190 and 195 . . . : 4 to 5-place personal airliners with every safety and comfort feature—yet surprisingly economical to own and operate. *All-metal* . . . airline-type engines . . . the most luxurious personal plane built today. Larger, more luxurious cabin—more capacity, more speed, more range! See and try a 190 series Cessna yourself.

See Your Nearest Cessna Dealer or USE THIS COUPON

Cessna Aircraft Co., Dept. OG-1, Wichita, Kansas

Please send free literature giving complete description of the Cessna 140 ( ); Cessna 170 ( ); Cessna 190, 195 ( ); Literature for model builders ( ).

Name.....

Street.....

City.....County.....

State.....Phone No.....

When you specify Pacific *Precision Built* pumps you also specify and get Pacific's fast, dependable service that keeps your refinery or gasoline plant "on stream"

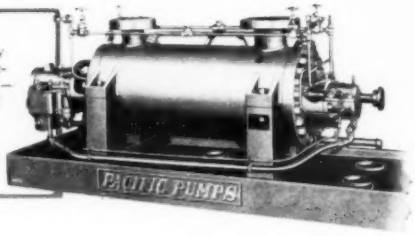
Here's Evidence

CASE A

Complete Rotating Assembly for 2½" two-stage pump – order received November 9th – shipped November 25th.

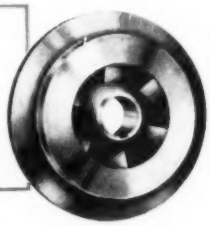
CASE B

Complete Factory Overhaul on a 4" five-stage hot charge pump – pump received May 3rd – overhaul completed and pump shipped May 10th.



CASE C

Two Chrome Steel Impellers (with heat-treated and hardened impeller wearing rings) – order received November 2nd – shipped air freight November 6th.



CASE D

Complete Factory Overhaul – The internal assembly for a 2" six-stage hot oil pump was received June 8th – overhaul was completed and assembly shipped June 17th.

CASE E

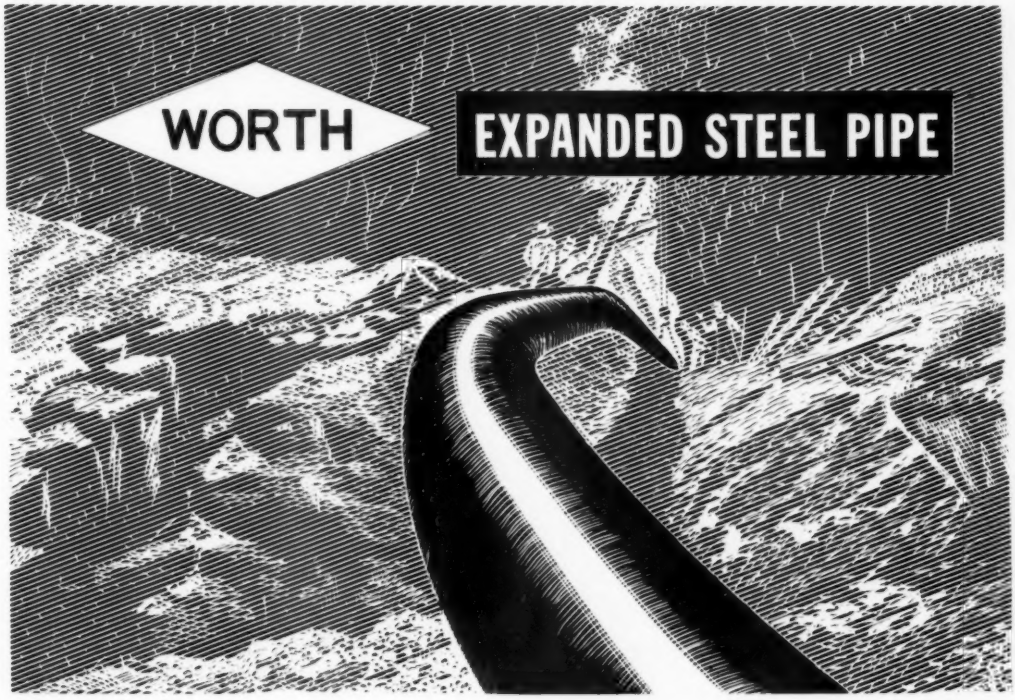
An emergency phone call at 9:30 p.m. resulted in a shaft for a 6" seven-stage pump being loaded on a plane at 11:30 p.m. the next day.

Pacific Pumps inc.
ONE OF THE DRESSER INDUSTRIES
HUNTINGTON PARK, CALIFORNIA
Export Office:
Chanin Bldg., 122 E. 42nd St., New York
Offices in All Principal Cities

PACIFIC *Precision Built* **PUMPS**

PR-9

PACIFIC'S SERVICE DEPARTMENT is organized to render you the personalized service that keeps your Pacifics "on stream."



EASIER TO BEND AND WELD

. . . because toughness and yield strength are accurately controlled Worth Welded Steel Pipe is easier to handle in the field.

Other advantages include: availability in 40′ lengths in 24″, 26″, 30″ and 36″ O.D.; freedom from surface defects; uniformity of gauge and quality; and, reasonably prompt deliveries.

Write for full details.

FLANGED AND DISHED HEADS • CARBON AND STAINLESS-CLAD STEEL PLATES

WORTH STEEL COMPANY • Claymont, Delaware

AN IMPORTANT ADVANCEMENT IN PNEUMATIC FLOW CONTROL

HERE'S flow control flexibility . . . one instrument for any application, regardless of flowing medium. The absence of mercury avoids process contamination . . . the Stainless Steel bellows are non-corrosive. In addition, installation is simplified and piping problems are minimized.

The Brown Pneumatic Flow Controller with Barton Meter Body makes an ideal combination . . . adds a new degree of freedom to control of flow and utilization of pneumatic transmission.

Call in your local Honeywell engineer for a discussion of your applications . . . he is as near as your phone!

MINNEAPOLIS-HONEYWELL REGULATOR CO. • BROWN INSTRUMENTS DIVISION

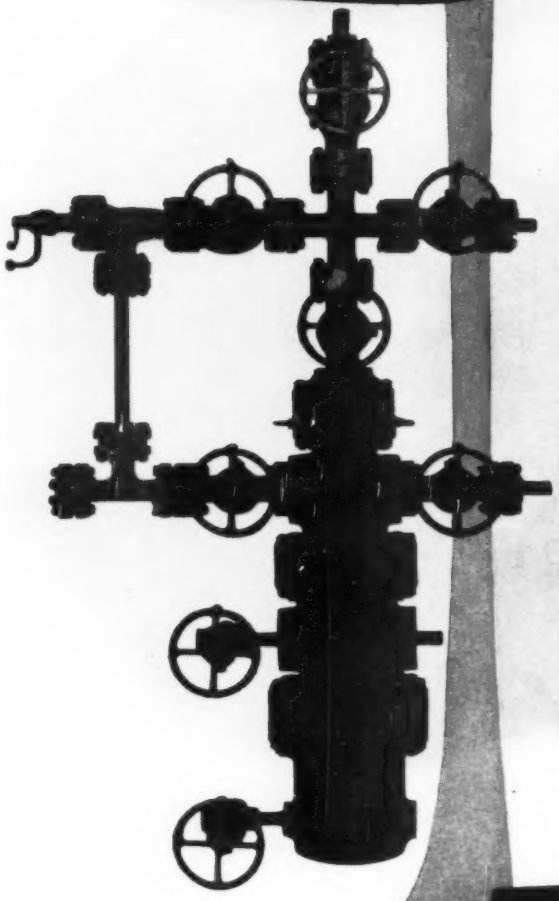
4488 Wayne Ave., Philadelphia 44, Pa.

Offices in 77 principal cities of the United States, Canada and throughout the world

The Brown Pneumatic Flow Controller with Barton Meter Body brings more convenience and less maintenance

Honeywell *Advanced Instrumentation* FOR THE PETROLEUM INDUSTRY BROWN

this Christmas Tree *mustn't light up!*



Or it won't feel a roughneck's hand on its valve wheel!

To make sure a National Christmas Tree won't leak in service, we make sure it won't light up under test. No light . . . no leak.

Here's how it works out . . .

All along the production line, the various parts of National Well Head equipment are machined to extremely close tolerances, gaged and checked, gaged and checked.

Then at the end, the whole unit is pressure-tested with a turbulent mixture of "wetter" water and fluorescent dye, under a "black light". If a drop of water is even planning to leak through, it glows green under the light, shows sharp-eyed inspectors where the trouble is.

But before testing makes certain, National engineers have designed and built the National Christmas Tree to give you a well-head assembly that does *better* all the things you expect it to do . . . flexible combinations of designs and sizes, full-opening units, extra-strong sections where stresses are heavy.

THE **NATIONAL** SUPPLY COMPANY

GENERAL SALES OFFICES: TOLEDO, OHIO

NATIONAL BLUE PRODUCTS

DIVISION OFFICES: CASPER, FT. WORTH, PITTSBURGH, TULSA, TORRANCE.
CANADA: THE NATIONAL SUPPLY COMPANY, LIMITED, ROOM 202, ALBERTA BLOCK, CALGARY, ALBERTA.
EXPORT: NATIONAL SUPPLY EXPORT CORPORATION, 30 ROCKEFELLER PLAZA NEW YORK, N. Y., U. S. A., RIVER PLATE HOUSE, 12 SOUTH PLACE, LONDON, E. C. 2.

YES—MANAGEMENT KNOWS A

Real Power Bargain!

USE *Utility* ELECTRIC POWER

MORE and MORE WELLS ARE PUMPED BY *LCP EVERY DAY!

I'm *LCP—management's most efficient employee! With me on the job, you have lower installation cost—lower maintenance and payroll cost! I'm a **FLEXIBLE** fellow . . . I can adapt myself to any job—big or small! You pay only for the actual power you use! Investigate me from every angle. I'll prove that *LCP is a **REAL POWER BARGAIN!** The Power Engineer of your Utility Electric Power Company has the facts!

*LOW COST POWER

PETROLEUM ELECTRIC POWER ASSOCIATION

Between these points:

Dependable delivery of Kaiser Steel line pipe

If you operate in the western two-thirds of the United States, you can expect *dependable* delivery of highest quality steel line pipe—*at competitive prices.*

As the nation's newest source of steel line pipe, Kaiser Steel's mill at Fontana and Basalt-Kaiser facilities at Napa, California, offer a complete range of diameters in lengths up to 40 feet. Production capacity assures you that the most demanding delivery schedules will be met.

Kaiser Steel line pipe to latest API specifications—in diameters up to 30 inches, and in lengths up to 40 feet—is now available. Shipping points are Fontana and Napa, California.

It's good business to do business with

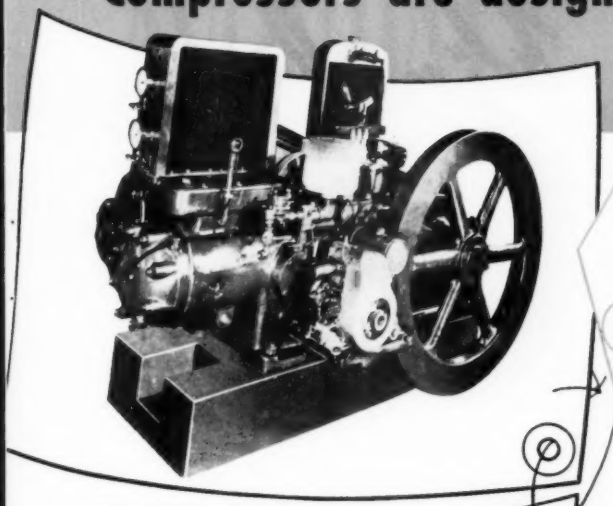
Kaiser Steel

KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

Type	Diameter	Length	Wall Thickness	Shipping Point
Electric Resistance and Fusion Weld—Plain End	$8\frac{5}{8}$" to 22" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	$5\frac{9}{16}$" to $12\frac{3}{4}$" O.D.	Up to 55'	.188" to .400"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	24" to 30" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser

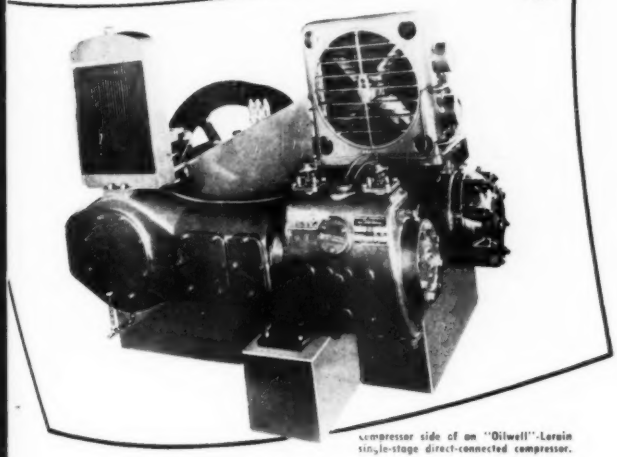
Prompt, dependable delivery at competitive prices • **KAISER STEEL CORPORATION** Los Angeles, Oakland, Seattle, Houston, New York

The New "Oilwell"-Lorain Direct-Connected Compressors are designed *for*—



Engine side of an "Oilwell"-Lorain single-stage direct-connected compressor.

GAS LIFT PRODUCTION
RECYCLING OF GAS
SECONDARY RECOVERY OF OIL
UNDERGROUND STORAGE OF GAS
GAS TRANSMISSION



Compressor side of an "Oilwell"-Lorain single-stage direct-connected compressor.

20·30·40·50 HP available in both single and two-stage

"OILWELL"-Lorain Direct-Connected Compressors handle gas at the pressures required by the Oil and Gas Industry as compressors, gas boosters and vacuum pumps.

THESE FEATURES WILL INCREASE EFFICIENCY IN YOUR GAS-BOOSTER OPERATIONS

COMPACTNESS — The compressor, of these new type "Oilwell"-Lorain units, is "direct-connected" with the engine; making a complete one-piece gas compressor station ready for immediate service.

DEPENDABILITY — "Oilwell"-Lorain Compressors are designed to withstand hard, continuous service with a minimum of attention and maintenance.

FLEXIBLE POWER END — Single-cylinder, two-cycle Lorain Engines are designed for operation on natural gas, propane or butane. Conversion to diesel operation can be accomplished easily and quickly.

Contact your nearest "Oilwell" representative and ask for our latest compressor literature. Your "Oilwell" representative is always ready and willing to provide technical assistance in analyzing your compressor needs.

BRIEF SPECIFICATIONS — 30 HP Unit

	Single-Stage	Two-Stage
Operating Speed Range	250-450 rpm	
Cooling System (engine)	Radiator Type	
Cooling System (compressor)	Radiator with pump	
Compressor Bores	To customer specification	
Engine Bore and Stroke	9½" x 10"	
Height	48"	62"
Length	136"	149"
Width	39"	39"
Net Weight	6500 lbs.	8000 lbs.

OIL WELL SUPPLY COMPANY

Branches Serving All Oil Fields

Executive Offices—DALLAS, TEXAS
Export Division Office—
30 ROCKEFELLER PLAZA
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Division Offices—CASPER, WYOMING
COLUMBUS, OHIO . . . DALLAS, TEXAS
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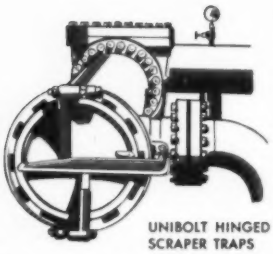
LOS ANGELES, CALIFORNIA

USS "OILWELL"

UNITED STATES STEEL



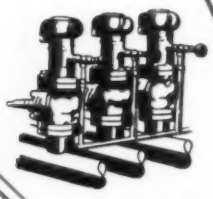
UNIBOLT HINGED
SCRAPER TRAPS

Pipeliners

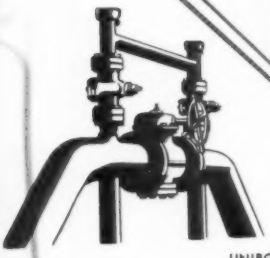
ARE MAKING THE MOST

OF A GOOD THING...

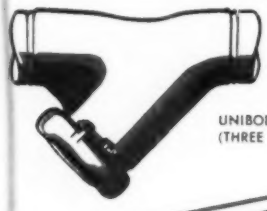
UNIBOLT



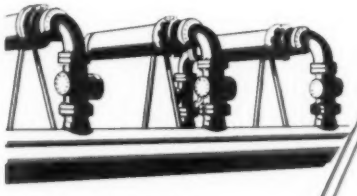
UNIBOLT COUPLINGS
WITH BLANKING PLUGS
ON TERMINAL MANIFOLDS



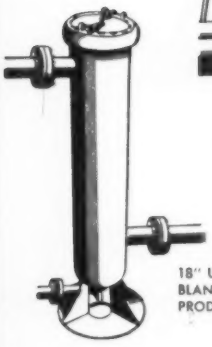
UNIBOLT COUPLINGS WITH
BLANKING PLUGS ON
GAS LINE BLOWDOWN



UNIBOLT STRAINERS—
(THREE TYPES)



24" UNIBOLTS ON
MAIN LINE GAS SCRUBBERS



18" UNIBOLT WITH
BLANKING PLUG ON
PRODUCT LINE FILTER

On any pipeline connection where flanged unions or closures are now used, a UNIBOLT Coupling can be employed to real advantage.

One, UNIBOLT provides a safer, stronger, joint because the unique UNIBOLT design places more metal in shear.

Two, UNIBOLT provides a more convenient connection or closure because of its time-saving design and blanking plugs which are available with a hinge to facilitate opening and closing.

Three, UNIBOLT provides a light-weight, less bulky unit which is economical, completely salvageable and interchangeable.

Presented here are the most common uses of UNIBOLT Couplings and blanking plugs in pipeline service. Complete details on each product will gladly be sent on request. Inquiries are invited on special pipeline manifold fabrication service.

THORNHILL-CRAVER CO.

HOUSTON **TEXAS**

AVONDALE

has the tools...

TO SAVE YOU MONEY ON MARINE REPAIRS

You, IN THE OIL INDUSTRY, know the importance of the right tools for the right job! It is the same with marine repairs—the right tools for the job can save more time and more money. Take, for instance the 800,000 lb. press shown above. . . . AVONDALE'S other special tools include rollers, plate brakers, lathes and many others. These, plus AVONDALE'S 24-hour machine shop service, can save YOU money on all types of marine repairs—no matter how large or how small. Call AVONDALE, consult our experts—get our estimate on your job.

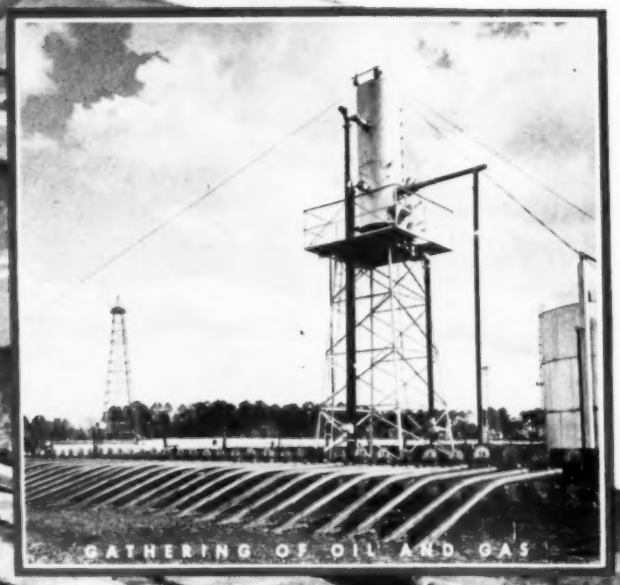
STEEL

AVONDALE MARINE WAYS, INC.

RIVER FRONT, NEW ORLEANS DISTRICT
MAILING ADDRESS: WESTWEGO, LOUISIANA

MAIN PLANT: AVONDALE, LA.
QUICK REPAIR PLANT — HARVEY, LA.

Continental-



THE CONTINENTAL SUPPLY COMPANY, General Offices: DALLAS, TEXAS

The Continental Supply Company, Limited, 216 Lancaster Building, Calgary, Alberta

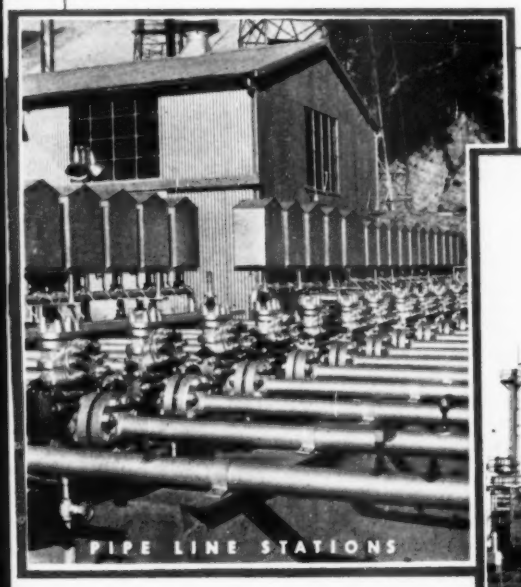
Export Division: The Continental Supply Co., Inc., 30 Rockefeller Plaza, New York, N. Y.

All the Way!

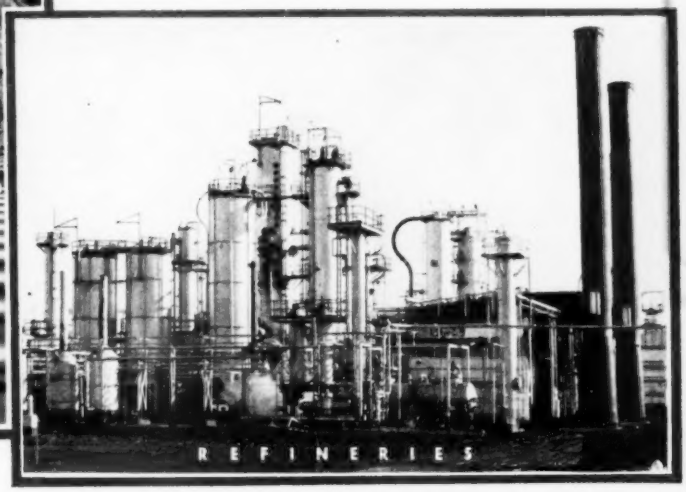
DRILLING—PRODUCTION—PIPE LINE—PROCESSING

THE GREEN TRIANGLE *Serving the Oil and Gas Industries*

For rig or refinery . . . for pipe line or gas plant . . . or for any important operation in the oil or gas industries, Continental is on hand to furnish proper and dependable equipment and supplies. With 72 strategically located Continental stores and offices at your command, you're assured of service second-to-none . . . *proven* "Green Triangle" Service—where and when needed.



PIPE LINE STATIONS



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CONTINENTAL

SERVING THE OIL AND GAS INDUSTRIES

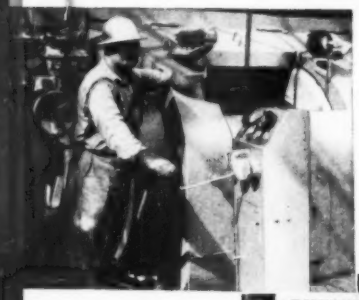
Representatives: ARGENTINA • BOLIVIA • BRAZIL • CHILE • COLOMBIA • ENGLAND • ECUADOR • PERU • TRINIDAD • URUGUAY • VENEZUELA

Fuel oil consumption is low on this G-E equipped, diesel-electric offshore rig. This is especially important because all required fuel oil must be brought out from the mainland.

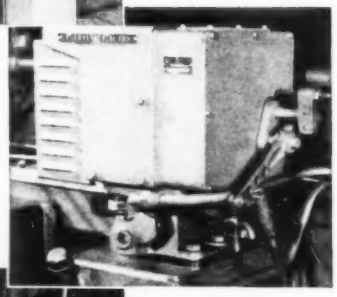
With this floating rig...

FUEL COSTS DIVE!

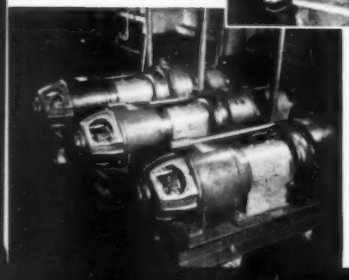
Another example of General Electric oil field electrification!



In a G-E drilling-rig drive, controls are centralized at the driller's position. Since they require only a few manual adjustments, the driller has more time for other duties.



The G-E electro-hydraulic governor system acts as an automatic "gear-shift" between d-c motor and engines. It prevents engine overloads, reduces fuel waste, cuts engine maintenance.



These G-E amplidynes, with their high amplification factor, use only a few watts to control main generator fields. When generators work in parallel, they automatically divide the load.

Here—along the Louisiana mainland—is one of the largest diesel-electric rigs ever built for drilling in shallow water. It's operated by a completely co-ordinated General Electric drive that provides flexible operation, lengthens engine life, lowers maintenance costs. And because diesel-electric drilling consumes only about 1/20th the fuel oil required by a steam-engine rig, the problem of over-water fuel transportation is minimized.

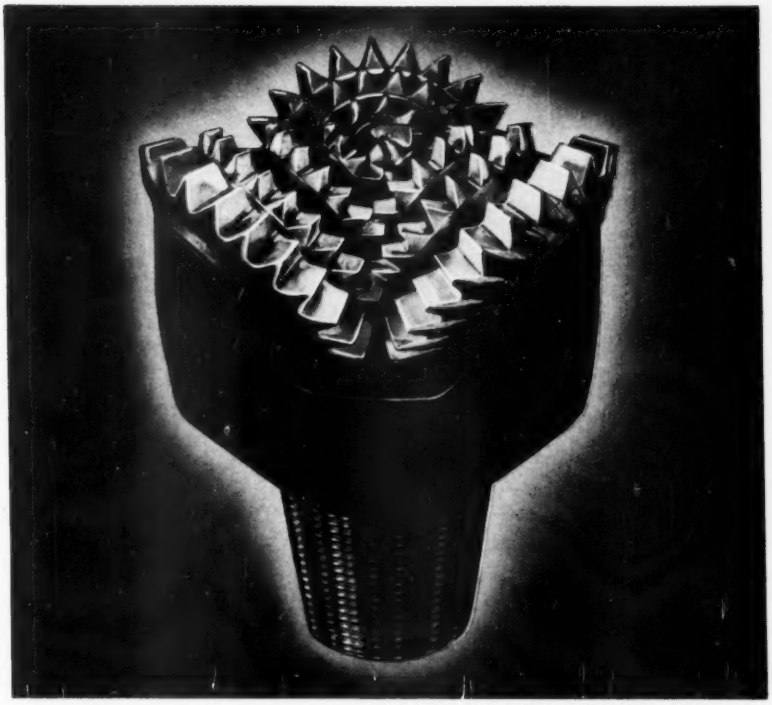
Engines protected against overloads!

Key to this drive's success is an electro-hydraulic governor which gives automatic diesel-engine speed and load control. This service-proved G-E device 1) protects diesel engines against damaging overloads, 2) saves fuel and unnecessary engine wear by enabling the engines to run at economical low speeds when desired instead of full-rated speed at all times, and 3) provides for engine paralleling without the operator's attention.

Deep well drilling—on land or sea—is only one of many oil-field jobs you can do more efficiently electrically—with the right G-E equipment. There's an oil production specialist in your local G-E office, ready to give you advice and help on all your electrical problems. Why not call him? *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

661-2



PHOTO, COURTESY HUGHES TOOL COMPANY, HOUSTON, TEXAS

Pass-key to Earth's most deeply-buried treasure

IN every stage of oil drilling steel plays an indispensable part. But most particularly in the rock bit. Here, not ordinary steel, but *alloy* steel must be used to supply super-strength, extra toughness, high resistance to impact, shock and abrasion. Without alloy steel it would be impossible to drill to the great depths being reached today.

Not only in drilling, but in the refining, storage and distribution of petroleum products, wherever equipment is subjected to stresses beyond the ordinary, wherever extremes of heat or cold are encountered, wherever unusual fabricating or operating conditions present a problem, U·S·S Carilloy Steels will usually provide the perfect solution.

In U·S·S Carilloy Steels we offer for the improvement of your operations a *complete* family of high quality alloy steels, that have behind them a record of superior performance in every phase of oil production. Here are steels for high temperature service. Steels for low temperature operation. Bearing steels. Gear steels. Steels in all AISI and SAE analyses as well as special alloys. Steels that lengthen life, steels that reduce costs.

These Carilloy Steels are available in the form of plates, sheets, strip, sketch plates, circles and structural shapes. In square, round and coiled bars. In spring flats, and special sections. In forging ingots, blooms, billets and slabs. We produce them in the widest range of sizes and heat treatment anywhere obtainable. In fact, whatever your requirements call for in alloy steel, we can provide.

Bring your steel problems to us. By combining your knowledge of oil with our knowledge of steel we can give you the steels that will do the best job for you at lowest cost.

CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH & CHICAGO

COLUMBIA STEEL COMPANY, SAN FRANCISCO · TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM

UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Carilloy Steels

USS

ELECTRIC FURNACE OR OPEN HEARTH

COMPLETE PRODUCTION FACILITIES IN CHICAGO AND PITTSBURGH

6-383

UNITED STATES STEEL

YOU CAN BANK ON UNION'S OIL COUNTRY WIRE ROPE SERVICE—

There is a qualified distributor serving your field of operations. Backing him up close at hand are these Union branches or mill depots manned by specialists and stocked with wire rope. Make full use of this unmatched organization. Get the best in service and in wire rope.

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New Orleans, La., 1539 Julia St. Corner of Freret St.
Odessa, Tex., P.O. Box 2249
Okla. City, Okla., 900 S.W. Fifth St.
Portland, Ore., 2415 N.W. 22nd St.
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UNION WIRE ROPE CORP

union

Wire Rope

Union Wire Rope Engineers Announce

Tuffy

TRADE MARK

ROTARY LINE

Union Engineers, in the laboratory and field, have been working closely with operators on the problem of Rotary Drilling lines. With the right combination of steel and construction, they have developed, and in the field tested with good results, this new line.

It will be known as Tuffy Rotary and will be made for two operations—one for Jackknife drilling and one for Standard Rotary drilling. This will simplify ordering and delivering to you the proper specification and grade of steel to get the ultimate low-cost in Rotary Drilling.

Remember the name Tuffy and there is no need to remember former complicated specifications.

For instance a typical order will read viz: 2500 feet, 1⅛ inch Tuffy Rotary Jackknife line. Or, 2500 feet of Tuffy, 1⅛ inch Standard Rotary line. It is just that simple. Send the coupon today for full information.

UNION WIRE ROPE CORPORATION

2102 MANCHESTER AVE. **KANSAS CITY 3, MISSOURI**

Have your fieldman make contact with more information on Tuffy Rotary Line.

FIRM NAME_____

ADDRESS_____

CITY_____ ZONE_____

STATE_____

AR-302

SHALE

SHALE

AMERICAN PIPE & SUPPLY COMPANY ARROW SUPPLY COMPANY BETHLEHEM SUPPLY COMPANY BOVAIRD SUPPLY COMPANY BRADFORD SUPPLY COMPANY CEN-TEX SUPPLY COMPANY CONTINENTAL SUPPLY COMPANY C. W. COTTON SUPPLY COMPANY DUNIGAN TOOL & SUPPLY COMPANY FRANKLIN SUPPLY COMPANY FRENCH TOOL & SUPPLY COMPANY GREAT NORTHERN TOOL & SUPPLY CO. GREEN HEAD BIT & SUPPLY COMPANY

HOUSTON OILFIELD MAT'L. CO., INC.

HOWARD SUPPLY CO

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JONES & LAUGHLIN SUPP

LOUISIANA SUPPLY COMP

LUCEY PRODUCTS CORPORA

McJUNKIN SUPPLY COMPAN

MID-CONTINENT SUPPLY COM

THERE'S ONE NEAR YOU
O-C-T products are now available from more than 776 conveniently located supply stores
Availability and dependability . . . the most desirable features of any oilfield equipment . . . are now O-C-T trademarks! As a result of O-C-T's policy of selling exclusively through supply stores, O-C-T Products are available in every active area of the United States and will become available from additional locations in the future! As a result of progressive engineering and precision manufacturing practices, O-C-T produces a line of products that have materially increased the margin of safety in drilling, completing and producing high pressure oil and gas wells. On your next deep well . . . on your next well of any depth . . . take advantage of the availability and dependability of O-C-T Products. Buy O-C-T Quality Products from one of the 776 supply stores. There's one in your area!
OIL CENTER TOOL COMPANY, HOUSTON
ON THE WORLD'S DEEPEST WELL, ON THE WORLD'S HIGHEST PRESSURE WELL . . . O-C-T PRODUCTS HAVE PROVED DEPENDABLE.

MIDLAND SUPPLY COMPANY, INC. MOUNTAIN IRON & SUPPLY COMPANY MURRAY-BROOKS, INC. NATIONAL SUPPLY COMPANY NORVELL-WILDER SUPPLY COMPANY OIL FIELD EQUIPMENT COMPANY OIL WELL SUPPLY COMPANY PELICAN WELL TOOL & SUPPLY COMPANY PRODUCERS SUPPLY & TOOL COMPANY REPUBLIC SUPPLY COMPANY RODMAN SUPPLY COMPANY SOUTHWEST SUPPLY COMPANY SPIARS & WELLS EQUIPMENT COMPANY STANDARD SUPPLY & HARDWARE THE SUPERIOR IRON WORKS & SUPPLY UNITED SUPPLY & MANUFACTURING CO. UTILITY & INDUSTRIAL SUPPLY COMPANY WESTERN SUPPLY CO. WILSON SUPPLY COMPANY

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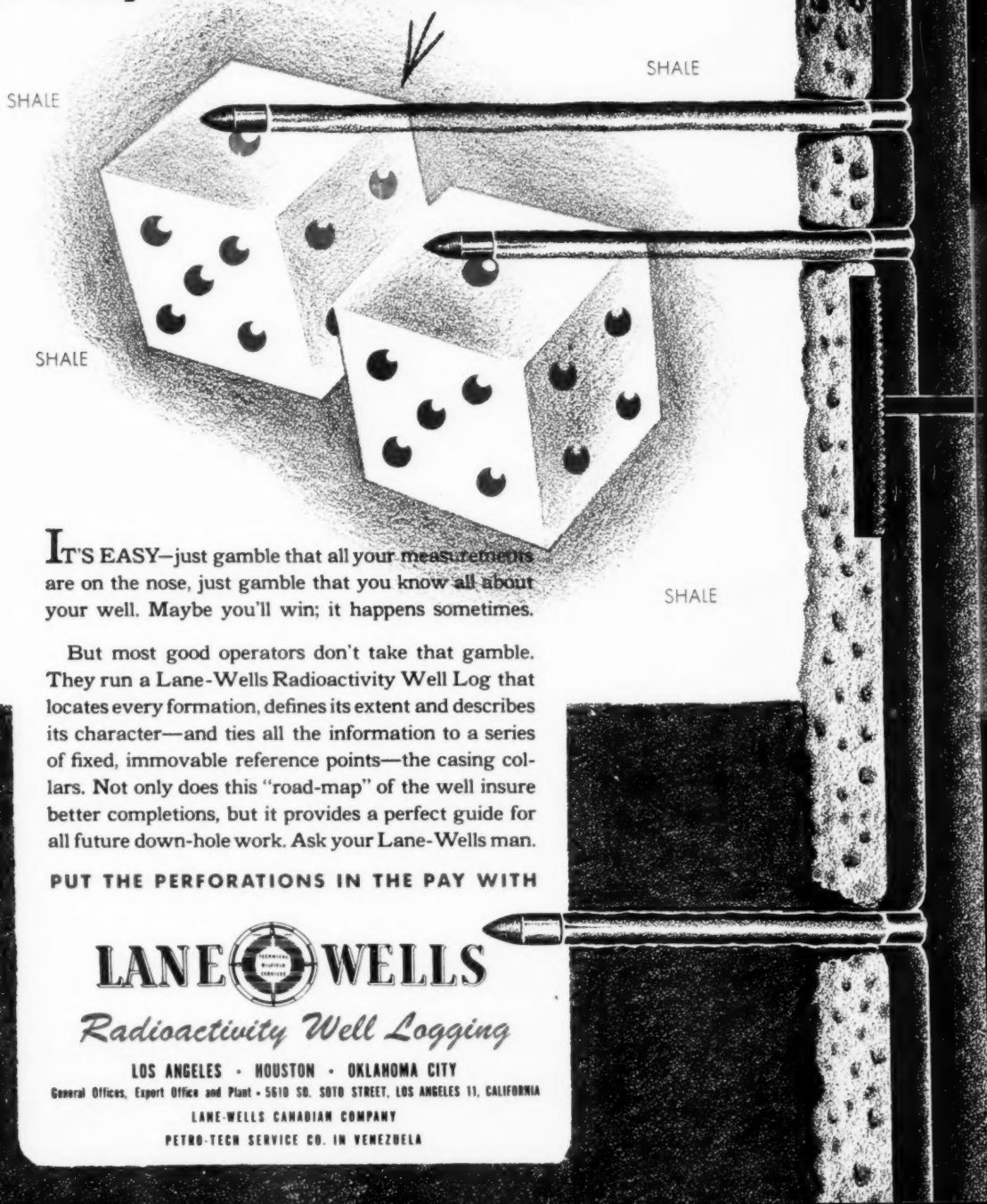
HOW TO LOUSE UP A $50,000 INVESTMENT



IT'S EASY—just gamble that all your measurements are on the nose, just gamble that you know all about your well. Maybe you'll win; it happens sometimes.

But most good operators don't take that gamble. They run a Lane-Wells Radioactivity Well Log that locates every formation, defines its extent and describes its character—and ties all the information to a series of fixed, immovable reference points—the casing collars. Not only does this "road-map" of the well insure better completions, but it provides a perfect guide for all future down-hole work. Ask your Lane-Wells man.

PUT THE PERFORATIONS IN THE PAY WITH

LANE WELLS

Radioactivity Well Logging

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LANE-WELLS CANADIAN COMPANY

PETRO-TECH SERVICE CO. IN VENEZUELA

Presenting

THE NEW

EMSCO D-850

DUPLEX POWER SLUSH PUMP

Here's a pump designed to meet the specialized requirements of deep drilling. A duplex power pump that gives you a combination of pressures and volumes heretofore unobtainable. No longer do you need to employ costly, complex systems for compounding two power pumps. No longer is it necessary to lose drilling efficiency due to the pressure and volume limitations of ordinary slush pumps. The D-850 incorporates many new and exclusive features which insure maximum efficiency and an absolute minimum of maintenance. It will pay you to investigate the D-850—the newest addition to the world-famous, field-proven Emsco line of all-steel "D" Series Power Slush Pumps.

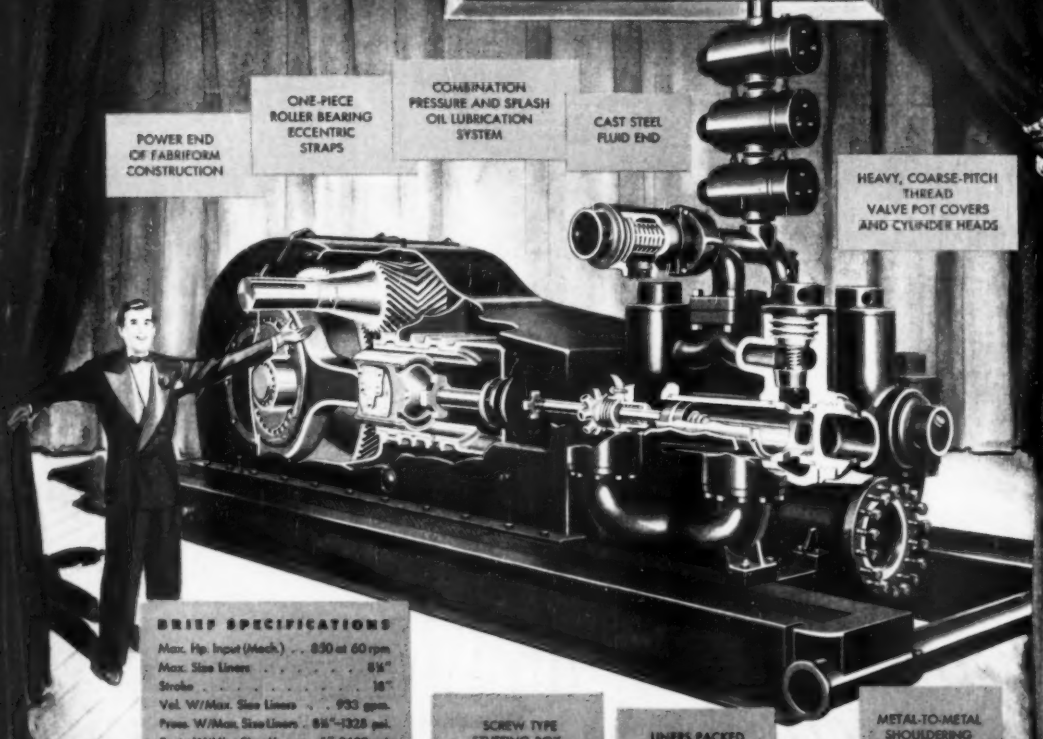
POWER END OF FABRIFORM CONSTRUCTION

ONE-PIECE ROLLER BEARING ECCENTRIC STRAPS

COMBINATION PRESSURE AND SPLASH OIL LUBRICATION SYSTEM

CAST STEEL FLUID END

HEAVY, COARSE-PITCH THREAD VALVE POT COVERS AND CYLINDER HEADS



BRIEF SPECIFICATIONS

Max. Hp. Input (Mech.)	850 at 60 rpm
Max. Size Liners	8½"
Stroke	18"
Vol. W/Max. Size Liners	933 gpm.
Press. W/Max. Size Liners	8½"–1328 psi.
Press. W/Min. Size Liners	6"–2680 psi.

SCREW TYPE STUFFING BOX GLANDS

LINERS PACKED AT BOTH ENDS AND EXPOSED TO VIEW

METAL-TO-METAL SHOULDERING OF LINERS

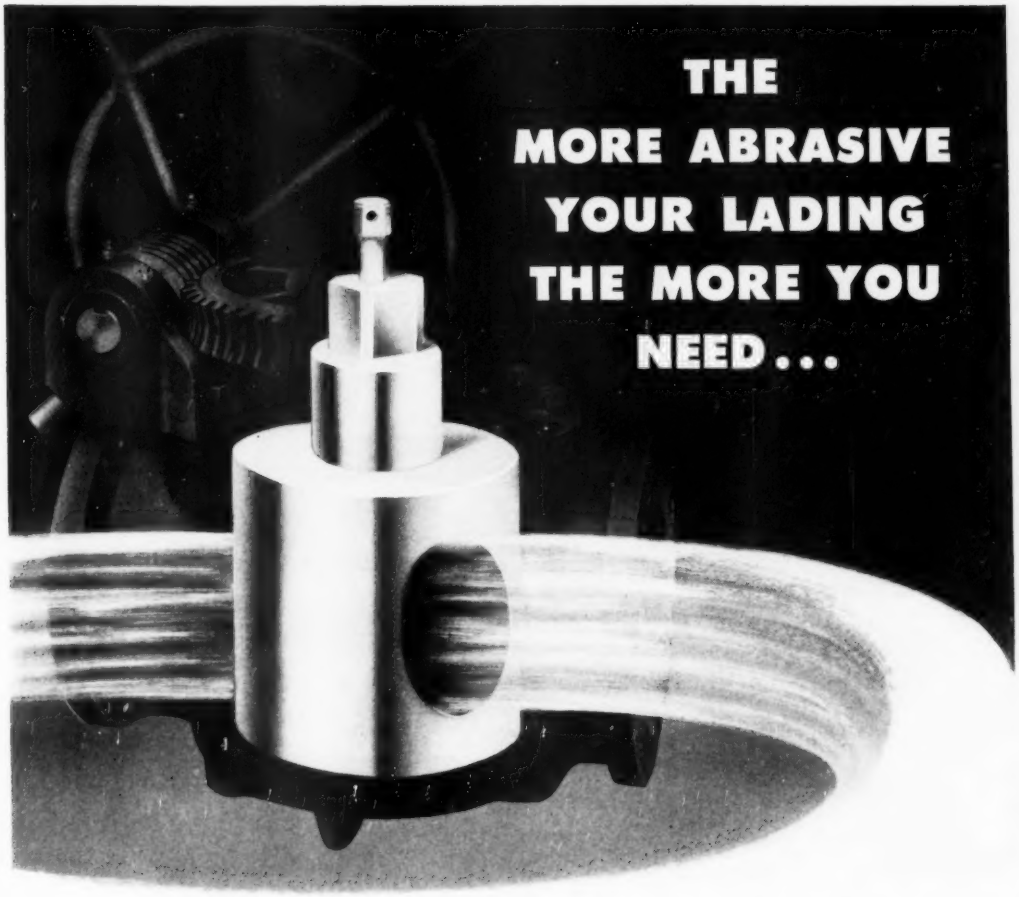
EMSCO DERRICK & EQUIPMENT COMPANY

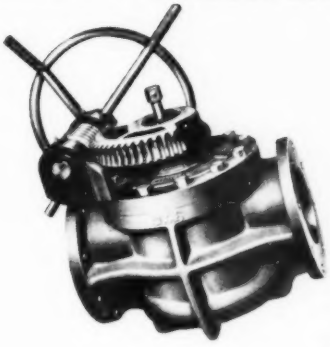
Houston, Texas • LOS ANGELES, CALIFORNIA • Garland, Texas

NEW BULLETIN ★ Bulletin F-170 describes and illustrates the new Emsco D-850 Slush Pump. Your letterhead request will receive prompt attention.

Adv. # 44-50

EMSCO





a.c.f. cylindrical plug valves

They alone provide the full-pipe-area passage, and straight-through round* porting, that can banish abrasion troubles. Lubricant-sealed from contact with the lading, the precision-machined plug does not wear or need attention, other than an occasional turn of the lubricating screw. Why use less efficient valves?

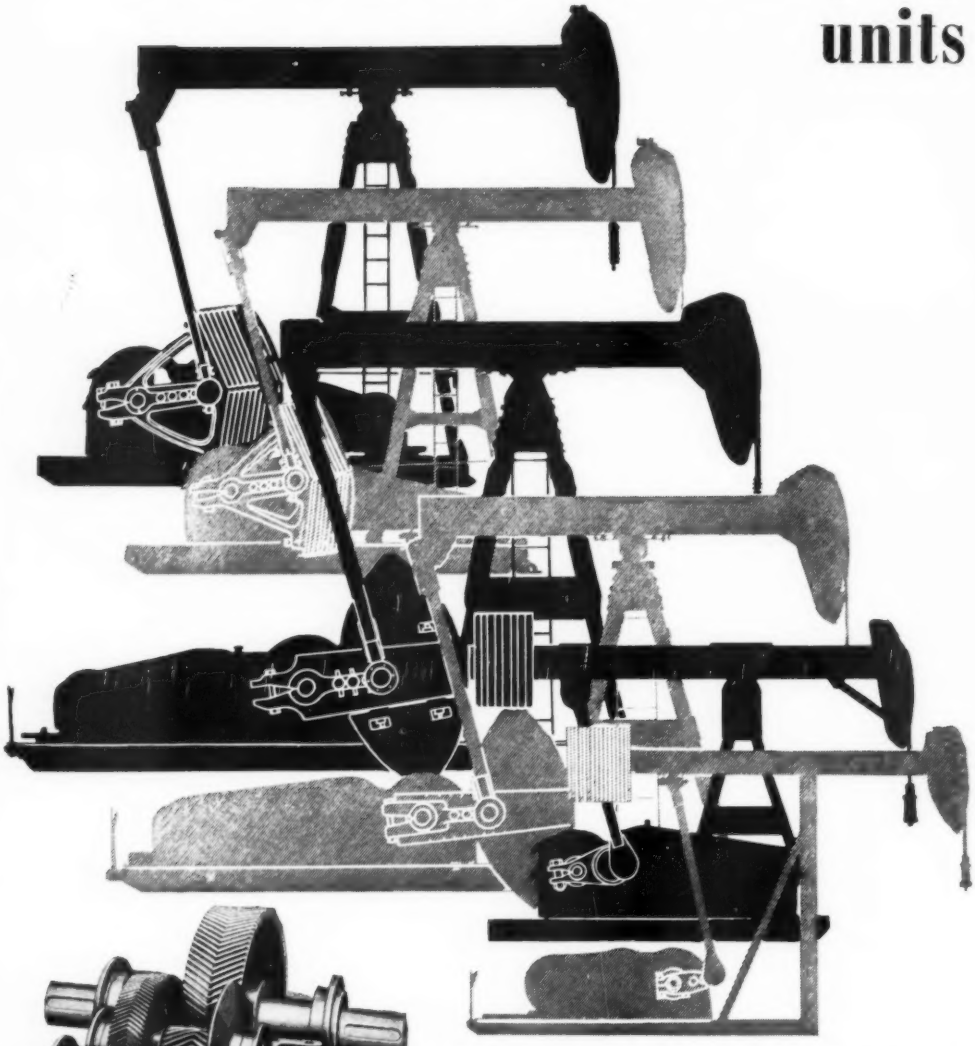
*Also available with full-pipe-area rectangular port.

a.c.f. CYLINDRICAL FULL PIPE AREA LUBRICATED **PLUG VALVES**

Representatives in more than 50 principal cities

Write for Catalog 4-OG, describing types and sizes, to: American Car and Foundry Company, Valve Division, 30 Church Street, New York 8, N. Y.

LE GRAND Pumping units



Gear Boxes, Double Helical, Double Reduction, built to A.P.I. Specification.

LE GRAND'S units range from 3,000 lbs., Polished Rod Load with intermediate sizes up to 31,000 P.R.L.

LE GRAND'S manufacture in England under licence the products of OIL CENTER TOOL CO., Houston, Texas, U.S.A.

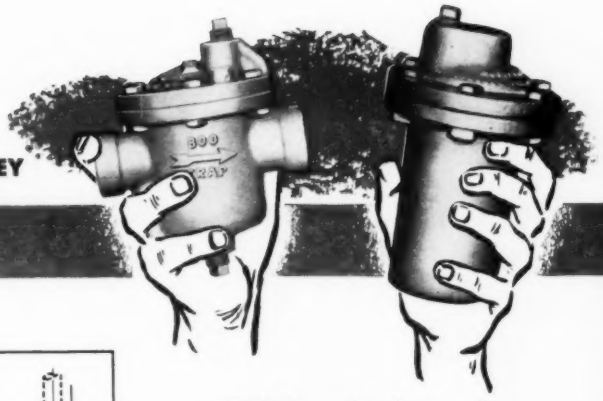
LE GRAND SUTCLIFF & GELL LTD

SOUTHALL, LONDON, ENG. ROCHESTER, KENT, ENG.

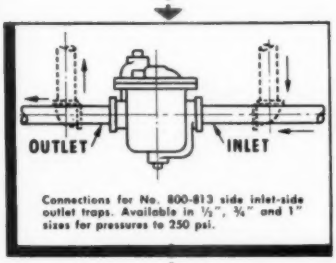
Telephone : Southall 2211 Telegrams : Legrand, Southall.
Codes : A.B.C. 6th Edition.

OILFIELD EQUIPMENT MANUFACTURERS & FOUNDERS

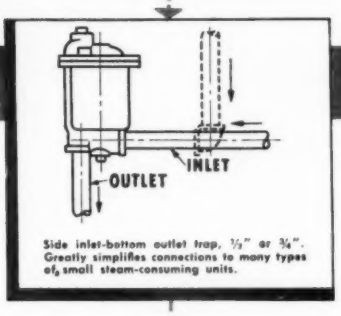
YOU SAVE
TIME AND MONEY



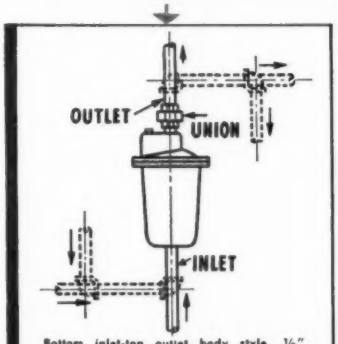
"This choice of
Steam Trap Body Styles
simplifies
installations"



Connections for No. 800-813 side inlet-side outlet traps. Available in ½", ¾" and 1" sizes for pressures to 250 psi.



Side inlet-bottom outlet trap, ½" or ¾". Greatly simplifies connections to many types of small steam-consuming units.



Bottom inlet-top outlet body style. ½" through 2" connections. Cast semi-steel bodies for pressures to 250 psi. Forged steel bodies for pressures to 1500 psi.

IN THE most widely used sizes, Armstrong Steam Traps are available in either side inlet-side outlet or bottom inlet-top outlet body styles. This gives the user an opportunity to make exceptionally neat installations with a minimum of fittings and a minimum of labor and permits correct location of the trap in relation to the unit being drained.

In both styles the entire interior mechanism may be taken out for inspection or repair simply by removing the cap. The body, full of boiling water, is left in the line. In the case of the side inlet trap the cap may be removed without even disturbing the pipe connections.

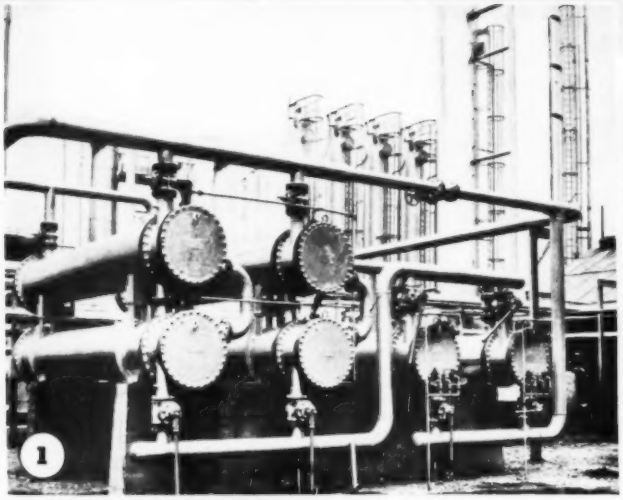
Ask your nearby Armstrong representative to show you the opportunities for simplifying trap installations.

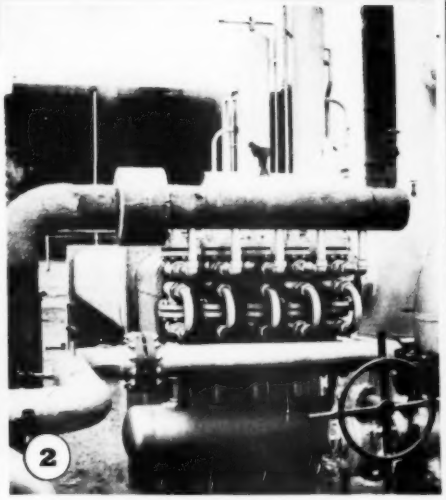
ARMSTRONG MACHINE WORKS
868 Maple St., Three Rivers, Mich.

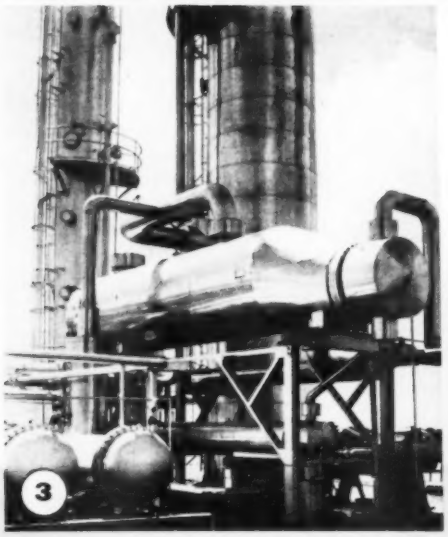
THE 36-PAGE ARMSTRONG STEAM TRAP BOOK gives data and prices on the complete line of Armstrong steam traps for every pressure, every application. This book is a valuable reference for the calculation of condensate loads and the selection of traps for all classes of equipment. Send for free copy today

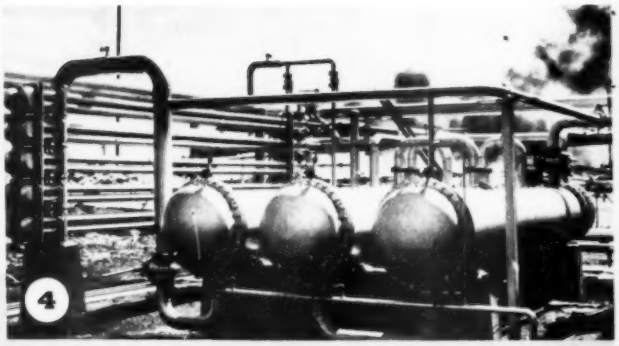
ARMSTRONG STEAM TRAPS

Heaters, Coolers, Exchangers,









1. 6 G-R Tubular Exchangers handling glycol-amine on both shell and tube sides
2. 10 G-R Twin Bare Pipe Section Regeneration Gas Heaters
3. G-R Solution Reboiler, and G-R Tubular Secondary Exchangers
4. 10 G-R Twin G-Fin Section Primary Exchangers, and 3 G-R Tubular Secondary Exchangers

GRISCOM-RUSSELL • PIONEERS IN HEAT TRANSFER APPARATUS

Reboilers...all G-R

The El Paso Natural Gas Company has so many installations of G-R Heat Transfer apparatus that a complete list would be difficult to compile.

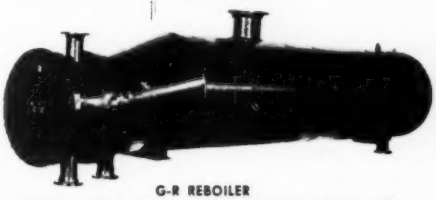
However, the accompanying photographs, taken at random at Jal, New Mexico, indicate the wide range of services for which the Company uses G-R apparatus. The illustrated G-R units include Twin G-Fin Section Primary Exchangers, Type FST Tubular Secondary Exchangers, a G-R Solution Reboiler, and Twin Bare Pipe Regeneration Gas Heaters.

This company, like so many others throughout the oil and gas industry, has evidenced its satisfaction with G-R Heat Transfer Apparatus in the most unequivocal and convincing manner — by wide use and by repeat orders.

You, too, can be assured of satisfactory service from heat transfer apparatus by standardizing on G-R. When doing so, you get the benefit of the unequalled G-R experience, the extensive variety of G-R designs, and the long-proven merit of G-R apparatus. Whatever may be your heat transfer needs . . . condensing, cooling, heating or heat exchange . . . be sure to consult the G-R engineers for their authoritative advice.

G-R TUBULAR EXCHANGER
A shell-and-tube unit with many distinctive features for efficient performance with minimum attendance and maintenance expense.

G-R TWIN G-FIN SECTION
The "universal" standard interchangeable heat transfer unit with longitudinally-finned elements. More than 40,000 installed sections.



G-R REBOILER
Widely used in process industries, and available with either bare tubes or K-Fin helically finned elements.

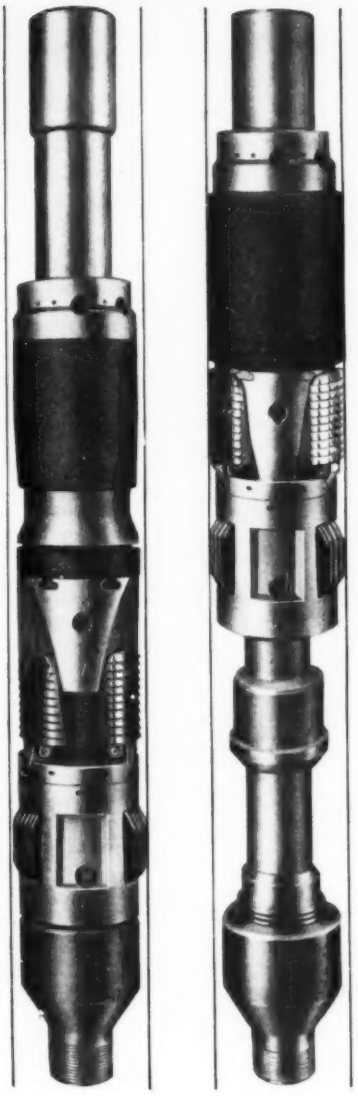
THE GRISCOM-RUSSELL CO., 285 MADISON AVE., NEW YORK 17, N. Y.

GRISCOM-RUSSELL

GR 250

how is this for *Packer Performance?*

SET AT 14,500 FT. WITH 15 LB. MUD and it *held*



On one of the deepest producing wells in the world—located in Southern Louisiana . . .

A WILSON Type "MB" *Metal Block* PACKER

was set at 14,500 feet with 15 pound mud—and "no trouble was encountered." This is but one of many runs on real deep wells where the Wilson "Metal Block" Packer has proven that regardless of the hydrostatic head, it will HOLD . . . that the element cannot cold-flow.

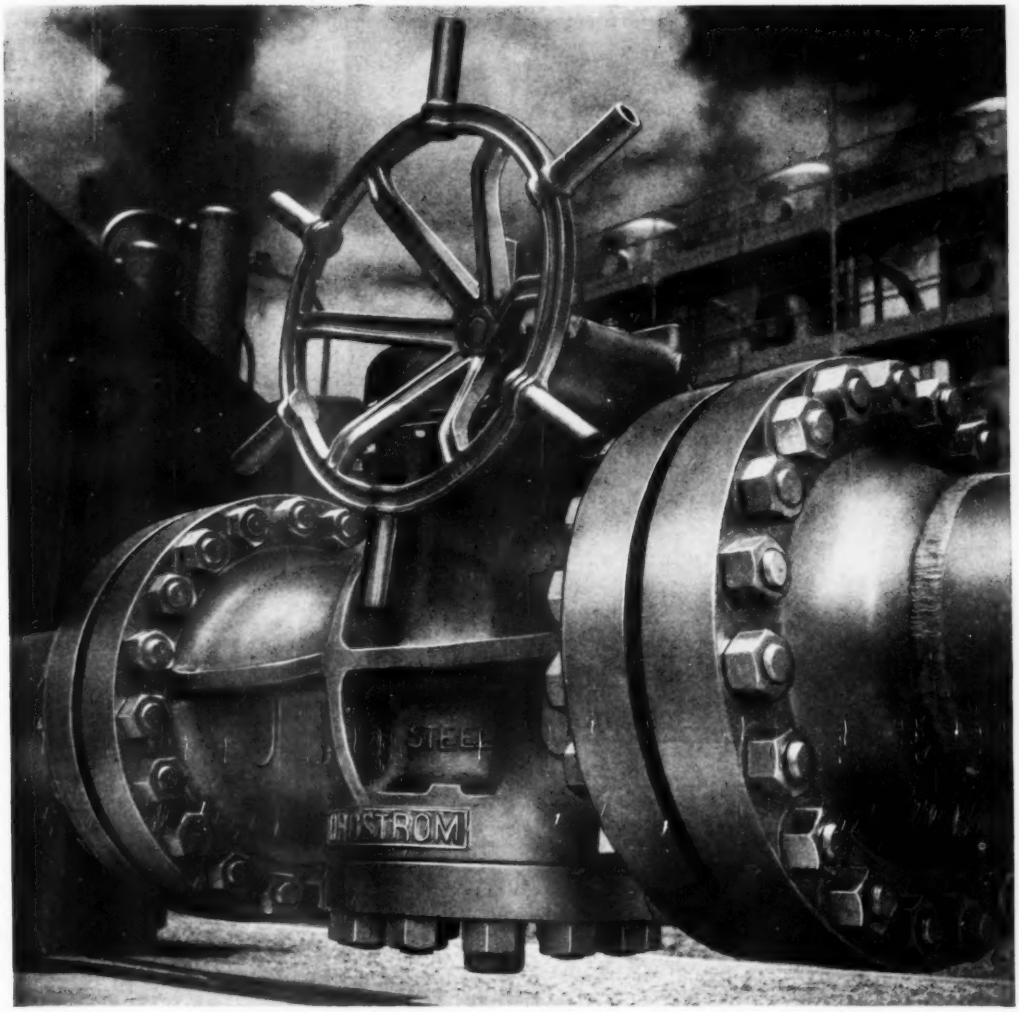
Yes—on the Deep Ones, save time, money and trouble—run a Wilson "Metal Block" Packer *FIRST* and know the performance will be satisfactory.

Contact your supply Store or write—

WILSON FOUNDRY & MACHINE CO.

1417 ELYSIAN STREET

HOUSTON, TEXAS



Nordstrom Valves

now *automatically* lubricated with

Trade Mark
ROCKWELL Hypermatic LUBRICANT
Pats. Applied for

NORDSTROM VALVE DIVISION **ROCKWELL MANUFACTURING CO.**

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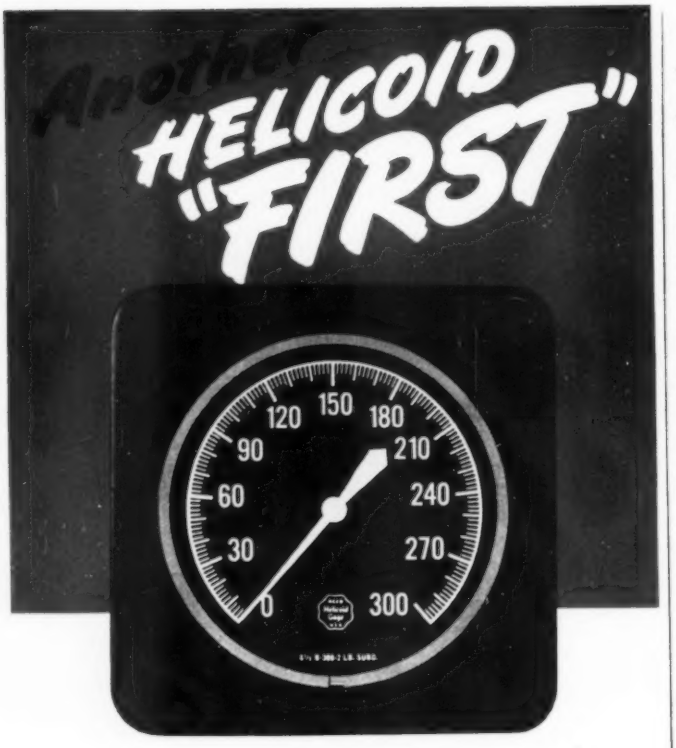
Atlanta, Boston, Chicago, Columbus, Houston, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco, Seattle, Tulsa . . . and leading Supply Houses
Export: Rockwell Manufacturing Co., International Division, 7701 Empire State Bldg., New York 1, N. Y.



THE NEW PRESSURE GAGE IN SQUARE, FLUSH CASE

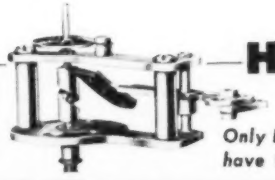
___ self-illuminated with black light just like airplane or automobile panel instruments for better visibility without glare

___ also available with white light or without illumination

___ ideal for symmetrical panel layouts

___ dial sizes 4½", 6" or 8½"—all standard pressure ranges

Write for complete information



HELICOID

Only Helicoid Pressure Gages have the Helicoid Movement

ACCO

HELICOID GAGE DIVISION
AMERICAN CHAIN & CABLE COMPANY, INC.
Bridgeport 2, Connecticut

TRADE MARK

They Say—

Kudos from Labor

"Management is still prone to treat the worker as an outsider, a hired hand who is not supposed to concern himself with productivity and costs. His brain is not needed nor wanted. His love of competition is rejected. His need for incentives beyond his wage is dismissed.

"Labor has never questioned management's right to leadership. Men instinctively respect competent leadership. This brings our attention to L. F. McCollum's address, 'Management's Frontier' of human relations.

"He sounds the keynote of one of the principles our Union stands for and is striving to bring about when he says, 'We are not on this earth just to make things or just to make money. We may enjoy the highest economic standards and the most complete security, but still that will not be enough. We want to express our personalities; to feel important; to be noticed; to be praised when we do a good job; and to be treated as individuals rather than as numbers.'

"Mr. McCollum's move to alert our supervisors to the importance of human relations in business management today fills us with a sense of cheer. His enumeration of what man wants and is entitled to expect from life today is a heart warming thing. It gives us confidence that we are on the right team and that we have reason to see a brighter tomorrow."

News and Views, Independent Oil Workers Union of Oklahoma.

Disappearing Refineries

"The picture is not so pleasant. . . . We are down to our last refinery. Our hope is that it will remain here. Other nearby cities—Warren, Franklin, and Oil City—have had to face this fact: That more and more refineries are finding it to their advantage to move to the coast."

Charles Stegner, Titusville, Pa., attorney, addressing the Titusville Chamber of Commerce.

Venezuelan View

"The most immediate danger to the Venezuelan oil-export industry comes from the possibility that the spokesmen for the independent oil producers may succeed in getting the American Congress to impose restrictions on imports of Venezuelan crudes or to raise the present import duties. . . .

"The United States consumes 40

per cent of Venezuelan oil exports, or about 500,000 bbl. per day. On the other hand, Venezuela spends $600,000,000 annually in the United States for the purchase of goods from manufacturers, farmers, and other exporters.

"However, if the restriction on imports is enforced in the United States, the immediate result would be the decrease in importation of articles which are not essential, such as automobiles, radios, refrigerators, and airplane and steamship transportation."

Manuel R. Egana, minister of fomento, as quoted in El Universal, Caracas.

"Token" Imports Cuts

"Token reductions in the oil-import plans of United States importing companies, as welcome as they are, fall far short of providing a solution to the problem that is threatening the existence of independent oil men and the economic health and security of our nation."

Statement of the executive committee, Texas Independent Producers and Royalty Owners Association.

Cheyenne Loses Out

"We hold that a community, or a section, cannot over-advertise itself. So we regret that the Wyoming Geological Association has seen fit to use the name 'Julesburg Basin' for a vast area of southwestern Nebraska, northeastern Colorado and southeastern Wyoming in which oil exploration has spurted of late.

"Before the association acted the region had been referred to 'Denver Basin,' 'Cheyenne Basin,' and 'Julesburg Basin,' with the latter name in use as early as 1928 in geological survey literature.

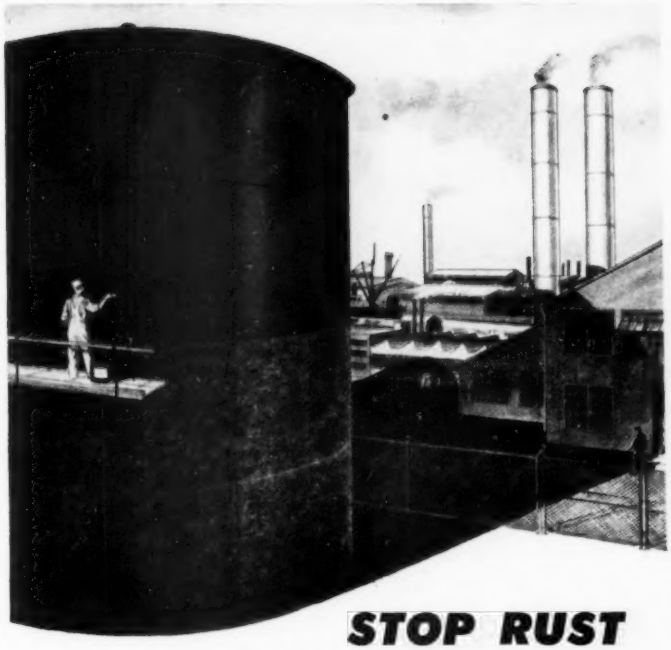
"We understand that the Ohio Oil Co. led the move which brought the designation of 'Julesburg Basin. As far as we are concerned the Ohio should have its wrists slapped. What was the matter with 'Cheyenne Basin' anyway?"

Editorial in the Cheyenne Tribune, Cheyenne, Wyo.

Canadian Possibilities

"In western Canada you find the great sedimentary basin extending from the United States boundary on the south to the Arctic Ocean on the north, being a distance of approximately 1,800 miles, and from the Rocky Mountains on the west to the pre-Cambrian shield on the east, covering an area of approximately 800,000 square miles.

"The vastness of this sedimentary basin may be more readily grasped if we realize that it is greater in area than the states of Texas, Louisi-



STOP RUST
***with* RUST-OLEUM**

Every day rust eats away at your metal tanks, pipelines, drilling and pumping machinery, metal buildings, structural equipment, roofs and fences. Yet you can stop rust instantly, surely, economically . . . put an end to rust losses . . . with RUST-OLEUM!

Industry of all kinds . . . railroads, steamship lines, iron and steel companies, refineries, in fume-choked industrial and coastal areas have proved Rust-Oleum for more than 25 years. They know that Rust-Oleum stops and prevents rust!*

Rust-Oleum can be applied without extensive preparation . . . even over surfaces that are already rusted. Rust-Oleum spreads evenly . . . free of brush marks. Its tough, pliable finish protects against every kind of weather, against fumes and heat . . . even against salt air and salt spray.

Beauty and durability are combined in Rust-Oleum for it is available in a large selection of colors . . . including aluminum and white.

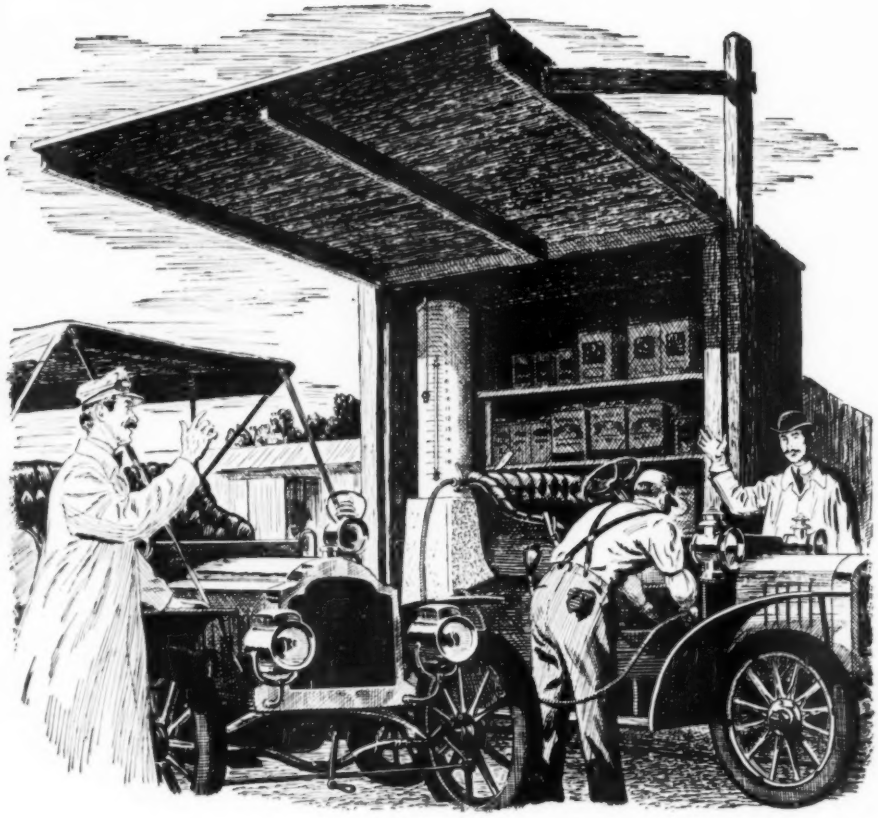
Don't wait another day! Let Rust-Oleum give you safe, sure, economical protection against rust. Use it to protect all your metal surfaces. Specify it to your painting contractor or architect. Industrial distributors in all principal cities of the United States and Canada stock Rust-Oleum to supply your every need. See Sweets for complete catalog and nearest source of supply, or write us direct.

*Names on request

If you have a rust problem, and would like a free survey and recommendations, send your name and address on your business stationery. A qualified factory representative will arrange this free service, which includes a trial size of Rust-Oleum for specific test purposes. There is no obligation on your part. Write today.

RUST-OLEUM CORPORATION

2542 Oakton Street • Evanston, Illinois



How America's first service station was born

One day back in 1907, a Standard of California man stood watching a line of impatient motorists in goggles and linen dusters waiting to buy five-gallon cans of gasoline at Standard's Seattle plant. He had an idea for serving customers more efficiently, more conveniently.

The next day a thirty-gallon tank which had been a kitchen water heater was installed opposite the main gate at the plant. To it were attached a valve-controlled hose and a glass gauge... so gas could be poured directly into the customers' cars.

That makeshift arrangement was the first service station in America.

Today there are more than 10,000 Company and Independent Dealer stations selling Standard of California products. The services and conveniences they offer... the improved products they sell... would probably make them hard to recognize by the men who developed the first station. For the people of Standard today, as then, continue to seek ways to make better products—and to serve better the people who use them.

STANDARD OIL COMPANY
OF CALIFORNIA
plans ahead to serve you better

ana, Oklahoma, Kansas, and California combined.

". . . It is safe to say that here in the prairie provinces of Saskatchewan and Manitoba, and particularly in Alberta, there is a greater concentration of major oil companies and larger independents than any other place on the continent."

N. E. Tanner, minister of mines and minerals, Edmonton, Alta., Canada.

Pig in a Poke

"The American people—hoping to better themselves—are buying a pig in a poke on the installment plan.

"Little by little they are accepting a socialistic thought, then a socialistic plan, then a socialistic law. England did it a little faster. Like a man buying a second-hand car on a gyp-artist financing plan, they don't see that what they are paying amounts to a tremendous cost in the final summing up, entirely out of line with the worth of the purchase."

R. F. Baity, vice president, Standard Oil Co. (Ind.), speaking in Milwaukee.

Degree-Day Explanation

"Sometimes I wish other suppliers would be as clever as the oil men in making sure we always have enough fuel oil in our cellars—regardless of the weather.

"The oil people do it with a thermometer and a card file. So accurate is the system that the oil men can tell within a few gallons just how much is in your tank on any given day.

"This is how they do it: they measure cold weather in what they call degree days. Since 65 is the temperature at which most folks begin heating, they use that as their base figure. For every degree the average outside temperature drops below 65 they register one degree day. For example, if Monday's high is 70 and the low is 40, then the average is 55. They subtract that from 65 and classify it as 10 degree days.

"Let's say then that the oil man determines your burner consumes a gallon of oil for every 4 degree-days—that's average. When he fills your 275-gal. tank, he sets aside a reserve of 25 gal. and records that you have enough oil to last 4 times 250—or 1,000 degree days. Thus, by keeping close check on the thermometer, he can tell when your supply must be replenished.

"Dates on the calendar don't matter, because the oil men tell time in degree days. That makes the whole thing very simple for the lady who runs the house. The degree-day system keeps an automatic check on fuel supplies, and deliveries are scheduled in advance."

Press and radio release, Mid-Continent Oil and Gas Association.

TOP: General view of the protected area.

CENTER: Foam discharge at the rate of 2 in. per min.

BOTTOM: Area covered by 6 in. of foam blanket in 3 min.

it's NEW!

"Automatic" AER-O-FOAM PROTECTION FOR INDUSTRY

For many years fire protection engineers have been faced with the problem of finding a feasible answer to the hazard caused by crowded plant facilities where flammable liquids are involved. Conditions of this type exist in many chemical processing industries, metal working plants, petroleum storage and handling and electric power generation properties. A severe hazard was evident at the Schenectady Varnish Company, Schenectady, N. Y., where fire at the tank car loading racks and storage facilities presented a constant threat to the operation of the entire plant.

Having had a background in the development of all types of automatically operated fire protection equipment, "Automatic" Sprinkler engineers designed and installed the mechanical foam system, test photos shown above, and which is now commercially identified as "Automatic" AER-O-FOAM.

The important engineering advantages of this form of protection are evident in the improvement of drainage conditions, reduction of water supply requirements, non-corrosive action of the foam material, positive fire extinguishment and prevention of reflash. As "Automatic" AER-O-FOAM dehydrates rapidly following application, clean-up operations are held to a minimum.

Pipe lines, or process pump houses, valve manifolds, loading racks, cracking units, and similar hazards familiar to petroleum processing industries can now be positively protected through the media of "Automatic" AER-O-FOAM. Your nearest "Automatic" Sprinkler representative will be glad to show you how and—at no obligation to you. Write or call today for descriptive literature.

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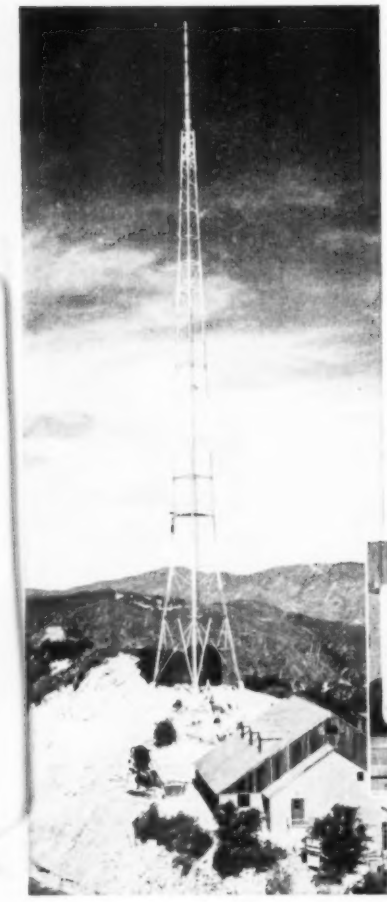
BASIC FORMULA FOR PETROLEUM ENGINEERS... M=PT....

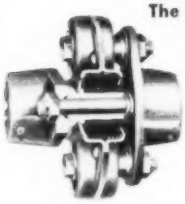


APPLY the formula M = PT (Morse means Power Transmission) to your coupling problems because Morse Chain makes the most complete line of flexible couplings available, all especially adaptable to your design needs.

Front-end power take-offs, flywheel coupling applications, cooling tower drive shafts and Diesel-electric generator sets (as illustrated below) have all proved the successful performance of Morse couplings through exhaustive field service.

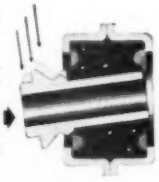
Always remember to follow the formula M = PT (Morse means Power Transmission) for best results on your coupling applications and *all other* mechanical power transmission problems. Morse products are immediately available from your local distributor's stocks.

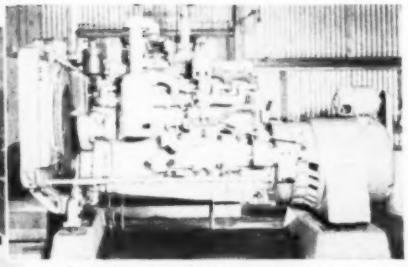
Morse Has 4 Types of Flexible Couplings The Right Coupling for Your Application



Morse Morflex Couplings, available in single, double and "Junior" types, are torsionally flexible, transmit power smoothly, isolate vibration, absorb shock loads. Require no lubrication or maintenance.

Morflex Couplings compensate for misalignment through elastic deflection of Neoprene "biscuits"—no metal-to-metal contact.





Your favorite television program comes to you from TV transmitters like this one atop Mt. Wilson. Diesel electric sets, equipped with torsionally flexible Morflex Couplings, guarantee the flow of electric current in the event of power-line failure.

Morse Radial Morflex Heavy-Duty Couplings use the same Neoprene "biscuits" assembled radially. All Morflex Couplings are impervious to water, dirt, oil and weather—never require lubrication or maintenance.

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Morse Morflex Flexible Couplings ☐ Morse Roller and Silent Chain Flexible Couplings ☐

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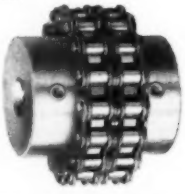

Morse Roller Chain Flexible Couplings, with double chain, have increased chain-sprocket bearing area, are compact, easily installed, durable, low-cost. Morse Roller Chain Couplings compensate for misalignment, provide positive power transmission. Available in wide range of stock and special sizes, with either steel or plastic covers.

Morse Silent Chain Flexible Couplings distribute the load so that unit stresses are small and uniform, service life is longer. The silent chain has a central guide link, which fits between coupling sprockets and centers the chain in relation to the coupling, permitting endfloat and endwise assembly or disassembly. Send coupon.

..... Morse *means* Power Transmission

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Morse Silent Chain Couplings

Morse Morflex Couplings

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Morse Morflex Drive Shafts

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Morse-Rockford Clutches

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From coast to coast there are more than 100 offices, representatives and distributors of Morse Power Transmission products to give you quick information and service when you want it—where you want it. *Ask the Morse Man first in any case!* Check your classified phone directory under **"Power Transmission"** or **"Chains"** for the nearest Morse Man.

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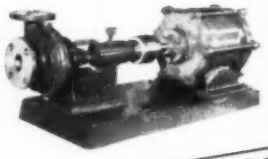
"Better Built" PROCESS PUMPS

IF IT'S REAL DEPENDABILITY YOU WANT — Pick a Quimby

QUIMBY CENTRIFUGAL PUMPS



Designed for continuous service, less maintenance, less time out for repairs, longer life. Wide range of sizes and types, in any machinable metal.

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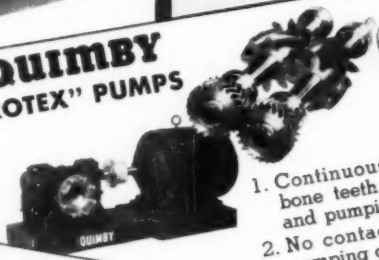

1. Continuous herringbone teeth on driving and pumping gears.
2. No contact between pumping gears.
3. Operates at direct-connected motor speeds.
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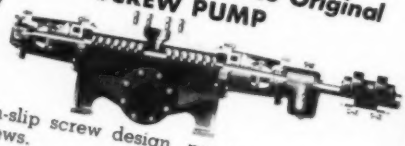

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2. Balanced power, pulseless discharge.
3. Full-floating shafts—100% anti-friction-bearing equipped.
4. Suction pressure only on stuffing boxes.
5. Continuous-tooth herringbone driving gears.
6. Direct-connected to motor.

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When you are buying pumps, remember that QUIMBY has been the standard of comparison for over half a century wherever correct design and rugged durability are appreciated. There is a correct size and type of QUIMBY for every pumping job. For detailed information, fill in the coupon and pin to your letterhead.

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JOURNALLY Speaking

Tough Request

EDITORS always like to get suggestions from their readers, but sometimes the dear readers make some pretty tough requests.

For instance, the other day one wrote: "Would you please keep your readers in closer touch with progress of new gas pipe-line projects prior to commencement of construction and before application is made to the Federal Power Commission?"

Now that's a worthy objective. Undoubtedly many readers would like to know such, and we'd be delighted to serve them. Only trouble is, that stuff is hard to get.

Application to FPC is usually the first formal step in a gas pipeline project. Prior to that there is a lot of private, behind-the-scenes dickering for financing, contracts, and gas reserves—often through "dummy" companies or anonymous third parties.

We print this dope whenever we can get it, provided we feel it is a bona fide project and provided we can do so without violating confidences.

In our zeal to do just what this reader requests, we sometimes have printed stories about projects which were still in the gleam-in-the-eye stage, or which were cooked up for promotional purposes, or maybe to scare off a potential competitor. Anyway, the lines were never built.

Such articles serve a reporting function because even a plan that failed is news. But usually we wait until a project is firmed up sufficiently to permit us to get some concrete, informative details.

And even application to FPC isn't positive assurance that the line will be built.

Sorry, Mr. Reader, but we're afraid you're asking us to be clairvoyants.

Birthday Party

UNION OIL CO. of California is 60 years old this month, and in looking around for ideas for a birthday party the company, as befits its Los Angeles situs, quite naturally hit upon movie stars and then went all out in true Hollywood tradition.

It has worked up a super-duper road show which is a combination movie, vaudeville, and musical comedy, including everything from harmonica players to cover girls. The whole troupe travels in a fleet of special vans and buses and will present the show to Union dealers and employes throughout the West. The musical comedy is said to be built around the theme of the economic advantages America has realized through its oil companies, but we'll lay a small bet that it gets slightly submerged by the theme of the entertainment advantages America has realized through Hollywood.

Anyway, we'd like to be on the coast 16 years from now when Union's birthday coincides with its "76" trade mark. That ought to be the occasion for nothing less than a world's fair.

Oil Stamp

THE Dominion of Canada is issuing a special 50-cent postage stamp honoring Alberta's oil discoveries, and may pick up quite a piece of change exporting these stamps to American collectors. In the view of certain independent producers in the United States, this stamp will be the only product of Alberta oil to come into this country without raising a ruckus.

Paper Base

"FEW Americans realize that their nation's capital, Washington, is the only capital city in the world that was hewn out of a wilderness and based on a government that was created on paper before it was created in brick and stone," says a press release from the National Capital Sesquicentennial Commission.

Maybe so, but we know a few Americans who believe that the Government is still in the wilderness and still based on an awful lot of paper.

Henry D. Ralph

DOWELL ACIDIZING SERVICE . . . Backed by 18 years experience in the field and by an active research program

On February 11, 1932, a group of men from The Dow Chemical Company introduced *inhibited* acid into an oil well in central Michigan. Although the well was scheduled to be abandoned, production was increased from 3 BOPD to 8 BOPD! This marked the *beginning of acidizing service* in the oil industry.

Eighteen years and some 75,000 acidizing jobs later, Dowell Incorporated, organized as a subsidiary of The Dow Chemical Company to take the new process to the oil fields, is still pioneering in the field of oil well acidizing. Dowell is constantly at work developing new and better acidizing equipment and materials. Dowell Service engineers draw on the company's eighteen year backlog of experience to bring you improved acidizing techniques.

Dowell's comprehensive program of research and development is carried on with just one objective—to provide better, more effective services for the oil industry. Put this development and research to work on your well! The next time you need an acidizing job, "Look to Dowell". There is a Dowell station near you.

DOWELL INCORPORATED
TULSA 3, OKLAHOMA
Subsidiary of The Dow Chemical Company

DOWELL
ACIDIZING SERVICE

Ask your nearest Dowell station for complete information on these Dowell services and products: Acidizing Service, Electric Pilot Services, Plastic Service, Chemical Scale Removal Service for heat exchange equipment, Jetlake, Paraffin Solvents, Magnesium Anodes for Corrosion Control and Bulk Inhibited Hydrochloric Acid.

"Petroleum Promotes Progress"

Look to DOWELL

FOR OIL INDUSTRY CHEMICAL SERVICE

The OIL AND GAS JOURNAL

VOL. 48. NO. 42 FEBRUARY 23, 1950

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In This Issue

News

Oil Industry Rising to Defend Depletion Allowance 111
Interstate Commerce Subcommittee Studying Oil Situation 112
British Curb on Dollar Oil in Sterling Area Now in Effect 113
FTC Reported Investigating Overseas Operation of U. S. Oil Firms 114
Louisiana Cuts Allowable 40,000 Bbl. Daily 115
Scurry Wildcats Being Watched as Possible Links Between Pools 116
Texas Expected to Announce New Oil-Allowable Method 117
Sunray Preparing Plans to Absorb Barnsdall 118
Pending Agreement May Set Pension Pattern in Oil Industry 119
Natural-Gas Industry Is Now Big Business 119
Sun Seeks More Details from McGrath in Antitrust Suit 119
Venezuelan Crude Cut; World Output High in December 120
World's Petroleum Reserves Seen Suitable for Next 30 Years 123
U. S.'s Venezuelan Imports Not Replacing Own Production 124
Anglo-Ecuadorian Oil Field, Ltd., Has Active Program 126
Two Reservoirs Proved in Yabase Field, Japan 126
Technologist Told They Must Accept Wider Responsibilities 129

Engineering-Operating

Design of Offshore Drilling Structures—A Symposium 135
Gulf Hurricane—and Subsequent Damage to Ohio Platform 136
Problems in Design of Offshore Drilling Structures 142
An Insurance Counselor's Views on Offshore Risks 146
Stanolind Platform Also Tested in Gulf Hurricane 150
New Safer Specifications Will Result From Blow 152
Oceanographic and Meteorological Factors 154
Chlorination of Petroleum Hydrocarbons 163
Cooling-Water Slime 170
Bender Lead Sulfide Treating Process 180
Planning Modern Gas-Compressor Stations—No. 3 183
Questions on Technology 195
The Refiner's Notebook—Instrument Symbols 197

Exploration-Development

Scurry Reef Play Jumps Southwest 219
Highlights of Week's Developments 219
Reports by Areas Start on Page 221
Operators Report More Footage, Fewer Completions 245

Departments

They Say 98
Journally Speaking 105
Editorial 109
This Week 110
Watching Washington 113
International News 120
Personals 131
Deaths in the Industry 134
Pipe-Line News 199
Pipe-Line Construction 203
Refining News 209
Drilling Contractors 213
Natural-Gas News 217
Exploration Statistics 234
Production Statistics 235
Refining Statistics 236
Market Statistics 237
Equipment Men in News 240
Classified Advertising 241
Calendar of Events 246
Advertisers' Index 246

You're right...

to want the best equipment for testing, acidizing, plasticizing, squeeze cementing —all of which are vital operations in well completion.

That's why you should use the Baker Model "RT-8" Retrievable Cementer, to provide a safe, positive device for...

- *testing casing, or locating holes in pipe;*
- *placing cement, plastic, acid, or any other fluid, at any necessary pressure, behind the casing or liner through perforations, or in open hole below the shoe;*
- *setting in lime formations for acidizing or squeeze cementing;*
- *pressure testing the effectiveness of a previously performed cement job.*

The Baker Model "RT-8" Retrievable Cementer (Product No. 411RT) is operated mechanically and is not dependent upon fluid pressure to set or release. It functions successfully in high-pressure wells, and will withstand with ample safety any pressure that may be imposed upon the well casing. It operates with equal efficiency and safety in low-pressure or low fluid level wells.

In addition to the obvious advantages of a "Retrievable" tool the Baker Model "RT-8" Retrievable Cementer has these outstanding features:

RUNS IN FAST—From 1 to 4 hours time is saved over the time required to run in a cementer equipped with swab cups;

RUNNING-IN STRING WILL NOT FLOW OVER while a Baker Cementer is being run-in hole at reasonable speed;

PERMITS CIRCULATING THE LONG WAY;

FUNCTIONS EFFICIENTLY IN LOW FLUID LEVEL WELLS as well as in high pressure wells;

PERMITS TESTING CASING, or protecting casing during squeeze job, by applying reasonable pressure to the annulus after cementer is set;

WITHSTANDS ANY PRESSURE below the cementer that is safe for the well equipment;

MAY BE ROTATED OUT OF THE HOLE—When the cementer is ready to be retrieved from the hole, rotation to the right will lock the slips in retracted position, thus preventing setting while coming out of the hole;

CIRCULATION POSSIBLE IF PACKING UNIT STICKS by means of a Circulation Joint above the cementer;

RELEASES IN EMERGENCY—Contains safety thread for quick release.

You can depend upon the Baker Model "RT-8" Retrievable Cementer

BAKER OIL TOOLS, INC.
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It's the Best

Evolution in Proration

THE large attendance at the San Antonio hearing of the Texas Railroad Commission last week, and the wide interest in the discussions that took place there, attest to the significance of the change under way in the application of proration programs.

The passing of the MER as the basis for allocating crude production, as announced at the hearing, was the inevitable result of an expanding production which finds Texas' potential output about 50 per cent greater than the current allowable. The job now is for the commission and operators to arrive at a substitute applicable to changed conditions.

Enlarged imports are an important factor in the domestic crude-oil market situation, but they are not the sole cause of present difficulties. Should supplies from foreign sources be reduced substantially—a development not now in prospect—potential domestic output has increased to the point where proration would still be necessary.

This brings up a basic problem. Additions to reserves come largely from new fields capable of large flush production. For example, the Scurry County discoveries account for a large part of the national increase in proven reserves last year.

Over-all, these new major reserves are hard to find and are increasingly costly. The operator fortunate enough to have leases in one of these fields usually has plenty of dry holes elsewhere. All operators need the incentive of a possible major strike to keep on trying.

The point here is that no proration policy is sound which discriminates against new fields of large potential production to the point where they cease to be economic. It has always been recognized that new discoveries were entitled to a "pay off" period with later allowables recognizing the large supplies available.

Furthermore, if the domestic industry is to be called upon to build up a large potential supply for a possible national emergency, it might be well to investigate the comparative position of the so-called "marginal" wells. Costs in these wells vary widely, and the application of fixed rules results in inequities as among operators and among pools.

Our final thought is that protests from business interests in an area should not be controlling in determining allowables which must be founded on the conservation of a natural resource. The development of fields inevitably becomes an integral part of general business activity, and in this regard there is no reason why one community should be favored over another in determining allowable output.

It has been said that the wisdom of ten Solomons would be required to answer to the satisfaction of everyone concerned all the questions posed at San Antonio. But a start at least can be made by a recognition of the principles involved in today's problems of conservation and proration.

THIS WEEK

INDUSTRY AFFAIRS—Sinclair companies make "precedent setting" pension and sick-benefits agreement with oil workers' union. . . . Called pattern for industry-wide drive. . . . More liberal than present plans of most oil companies or other industries. . . . ¶Sunray making active plans to absorb Barnsdall after purchase of 45 per cent of stock. . . . Merger will make Sunray one of the largest and most active independent producing companies. . . .

PRODUCTION—Texas Railroad Commission will change allowables system. . . . MER method abandoned. . . . East Texas chief beneficiary. . . . Flush pools and sour crude may be hit hard. . . . ¶Spectacular expansion of Canyon reef discoveries in Scurry and adjacent counties continues as important wildcats promise to link separate pools. . . . ¶Louisiana cuts allowables 40,000 bbl. per day for March, but it may be temporary. . . .

NATIONAL AFFAIRS—Strong industry testimony in support of depletion allowance gives observers hope that Treasury tax proposal will not be adopted. . . . Spokesmen tell committee depletion change would curb wildcatting and cause abandonment of stripper reserves. . . . ¶Ways and means committee now studying reduction on oil excise taxes. . . . ¶OGD officials tell House committee that oil imports are not yet a serious threat. . . . That state allowables soon will start upward trend. . . . ¶FTC springs surprise investigation of participation in "foreign cartels" by U. S. oil companies. . . .

INTERNATIONAL—Foreign crude production increased during December while U. S. production declined, bringing world total below previous levels. . . . But Venezuelan production is now showing a sharp downward trend. . . . ¶World crude reserves now close to 30 years' supply and still trending upward. . . . ¶British Empire embargo on much dollar oil goes into effect, though negotiations continue. . . . Venezuelan exports may be hit hard. . . . ¶Venezuelan official says exports not competitive with U. S. petroleum, as preparations are made to ship more heavy crude here. . . .

TRENDS—Stocks of gasoline, kerosine, and distillate fuels in all areas east of California were 1,500,000 bbl. higher at the end of 1949 than at the end of 1948. . . . On February 11, clean-products inventories in these areas were 300,000 bbl. less than a year ago. . . . ¶Better stock position was accomplished by a 1.4 per cent reduction in crude runs, since percentage yields of light products have been higher. . . .

ACTIVITY—Crude-oil production for the week ended February 18 averaged 4,913,675 bbl. daily, an increase of 42,875 bbl. over previous week. . . . ¶Total well completions were down 52 to 701 wells for the week but wildcat completions were up 10 to 144 wells. . . . ¶Total rotary rigs operating in United States increased 12 rigs to a total of 1,897 on February 13. . . .

PIPE LINES—Frontier Refining Co. authorizes Pacific Pipe Line & Engineers, Ltd., to conduct economic study and engineering survey for products line now under consideration from Cheyenne to Omaha. . . . ¶Associated Natural Gas Co., Tulsa, asks FPC authority to build $900,000 pipe-line system in southeastern Missouri. . . . ¶Texas Pipe Line Co. will construct 42-mile crude-oil pipe line from Patoka to Clay City, Ill. . . .

REFINING—Phillips subsidiary will build refinery and wax plant in Eastern Venezuela. . . . ¶Independent Refiners Association of America will support industry's fight to retain present depletion allowance. . . . ¶Process for salvage of oil and wax from settlings in bottom of petroleum-storage tanks developed by U. S. Bureau of Mines. . . . ¶Pan American Refining Co. announces new industrial fractionating-tower packing. . . .

WEATHER BREAK.—Severe weather, ranging down to 50° below zero, has hampered oil activity in Alberta this winter, but recently the temperature rose to between 10° and 20° above zero and induced a handful of sightseers to travel 13 miles from Edmonton to witness the shooting of the Chief Redwater Oil, Ltd., 1 Alberta Chief, drilled by Regent Drilling Co. At the far right is the shooting truck of Perforating Guns Atlas Corp.

Depletion Defended

More spokesmen for many phases of the oil industry attack Treasury's tax proposal as Texas senators predict victory

Bertram F. Linz

WASHINGTON.—The House ways and means committee went back for another look at the depletion allowance last week and found that the only support for the Treasury's recommendation for a reduction came from the C.I.O., whose Stanley H. Ruttenberg, director of education and research, said it did not go far enough.

Against this, the committee heard nearly a dozen congressmen and a half-dozen industry spokesmen argue against any tampering whatever with the allowance, warning that a reduction in rate would disorganize the oil industry, adversely affect the whole economy, and threaten the national security in the event of another war.

Unanimously the congressmen, who are not members of the committee, urged that the depletion allowance be left alone, several of them outlining how it has encouraged oil developments in their own districts and predicting a sharp cutback in activity and the loss of reserves underlying stripper wells that would follow a change in the present law.

The oil men who appeared before the committee included several who could not be heard when depletion was originally taken up February 7, and their argument was along the line of that presented at that time by the representatives of the industry committee.

For Texas.—A cut in the depletion allowance would severely affect oil production, the committee was told by R. B. Anderson of Vernon, Tex., chairman of the Texas Board of Education and deputy chairman of the Eleventh District Federal Reserve Board. In addition, he said, it would make it exceedingly difficult to get private capital for the development of a shale-oil industry on which the Government has spent several years and many millions of dollars.

Anderson, who has had 13 years' experience in the oil industry, commented on the fact that "everyone" seems to think the oil industry is a highly lucrative business when, in fact, only in about 1 year in 10 do the oil companies have a rate of return on invested capital equivalent to or greater than that of other industrial concerns.

Speaking as a state official, he told the committee of the situation in Texas, where the legislature has been called into session to raise additional money for the support of schools because of the reduced income resulting from the cutback in production allowables necessitated by heavy imports.

"If we stop the search for oil, if we hamper the activities of exploration and development, the economy of my state and others like it must suffer in direct ratio," Anderson said. "This cannot be a wise policy in Congress."

A reduction in the depletion allowance would force out of business a great many small operators; reduce the requirements for steel, mud, acid, pumps, and other equipment; mean that fewer geophysical teams and laborers would be required; reduce insurance premiums paid; cut down loans at banks; upset the economic stability of a large number of states; and force state governments into fields of taxation now used by the national Government. But it would not result in increased revenue to the nation, he declared.

For the Rockies.—Presenting the case for the Rocky Mountain operators, Glenn E. Nielson, president of Husky Refining Co., Cody, Wyo., and of the Rocky Mountain Oil and Gas Association, predicted that much of the additional oil required to put the country in position to meet an emergency will have to come from the West, where geologists say there are tremendous reserves which, however, will present "some of the toughest exploratory operations and hardest drilling in the nation."

"All of these factors point to extremely expensive operations requiring every bit of the incentives we now have for its accomplishment," Nielson said, adding that "when the Treasury implies that high crude-oil prices make the depletion incentive excessive, it overlooks the need for far larger incentives if the industry is to find and develop the relatively inaccessible reserves of this vast region.

"We must have the incentives provided by the present depletion allowance and intangible-cost deduction to make the reserves of the Rocky Mountains available," he declared. "This region is the last frontier."

For strippers.—In the long run, the committee was informed by Clinton Beard, manager of Northeast Oklahoma Oil Producers, Inc., Bartlesville, the Government will lose far more revenue from the abandonment of stripper operations than it can get from a reduction in depletion if the Treasury suggestion is followed.

Beard discussed specifically the situation in northeastern Oklahoma and southeastern Kansas, where average production per well is less than 1 bbl. a day except in a few instances where secondary-recovery operations are under way. Through secondary recovery, he estimated, Washington County, Oklahoma, will yield 600,000,000 bbl. and four Kansas counties will yield another 500,000,000 bbl. But a reduction in the depletion allowance, he warned, will divert capital to more profitable ventures, with the resulting loss of recoverable oil.

A similar situation exists in New York, where 22,540 producing wells have an average daily production totaling 11,500 bbl. but surveys indicate that 86,000,000 bbl. can be recovered with present known methods of secondary recovery, it was testified by Knight Thornton, director of the New York State Oil Producers Association.

The contention of the Treasury that a reduction in depletion will not affect secondary-recovery operations is not borne out by the facts, Thornton said.

"The Treasury proposal will reduce the average depletion allowed the secondary-recovery operator by the same ratio that it will any other operator," he told the committee. "The consequence of such a reduction in depletion allowance would cause the premature abandonment of wells, leaving oil behind that would never be recovered."

For wildcatters.—Assertions by the Treasury that the small operator usually sells his property before or shortly after it is developed are not based on fact, it was declared by Grant E. Judge of the accounting firm of Arthur Anderson & Co., Houston. The average wildcatter will sometimes sell a property in order to raise funds to develop other properties or pay off debts on prior development, or when development is more than he can finance, he said, but most operators are reluctant to sell out "and will usually dispose of a fractional interest in order to share with others the risks and obligations of development and operation."

Also, Judge said, the Treasury witnesses were wrong when they told the committee the purchaser of a developed property receives the full benefits of percentage depletion. A purchaser, he said, secures a benefit from percentage depletion only to the extent it exceeds cost depletion, and can get the former only to the extent that he is able to increase the reserves of oil through subsequent discovery.

The committee also heard from Governors Frank Carlson of Kansas and

Roy J. Turner of Oklahoma in opposition to any cut in the allowance. The views of Texas had been expressed at the beginning of the hearings by Ernest O. Thompson of the Texas Railroad Commission.

For the Senate. — As the committee turned its attention to other phases of the tax situation, both Texas senators expressed confidence there would be no cut in depletion, wiring Texas Gov. Allen Shivers to that effect.

Senator Connally, who is a member of the Senate finance committee which will pass on any bill sent over by the House, said that over the years he has been active in helping retain the allowance over "big opposition."

Congress Looks at Oil

Imports may be held to reasonable level, state allowables may start upward soon, OGD officials tell House committee

Bertram F. Linz

WASHINGTON.—The House interstate commerce oil subcommittee launched an investigation of the oil situation last week and was told at the outset that there is no easy solution to the problem of imports, but if the British plan to substitute sterling for dollar oil is "not too drastic" the present flow of foreign oil into this country may be checked.

But Hugh A. Stewart, director of the Oil and Gas Division, expressed the belief that so far independent oil producers are "more scared than hurt" and Assistant Director Edward B. Swanson later expressed the opinion that the downward trend of production is about at an end and the state regulatory authorities could be expected to begin increasing allowables in the near future.

Of major importance, Stewart testified, is the fact that for the first time in some years the domestic industry has built up a large excess of producing capacity, and the country now has a "comfortable surplus." This, together with development of large reserves in Canada, makes the national security picture much brighter than it was when the subcommittee last surveyed the situation.

While he refused to discuss defense matters which properly come under the military, Swanson told the subcommittee "we have certainly a reserve productive capacity available now which would carry us through any of the early stages of an emergency" but the final effect would depend on the extent and location of the need.

Broad study.—At the outset of the hearing, Rep. Oren Harris of Arkansas, chairman of the subcommittee, explained that the investigation was undertaken under the general authority given the interstate commerce committee in a House resolution, and will go into the oil situation generally as well as into the merits of his bill to create a National Oil Policy Council and other measures dealing with oil that have been introduced.

The hearings will be spread over a number of weeks and will cover exploration and development; supply; production; refining and processing; imports; needs for supplying demands; economic problems of the industry; transportation, storage, and marketing; conservation and control; and the foreign situation. Witnesses will include government experts, members of Congress who have sponsored legislation, and petroleum-company officials.

Harris told the OGD officials that Congress, the industry and the country want to know what is ahead in oil, and while he made no special point of it he intimated that he would like government witnesses to give definite answers to questions propounded by the subcommittee, pointing out that frequently it is told that studies are under way but that they never seem to be concluded.

Aside from imports and the Anglo-American controversy, Stewart testified there are a number of other factors entering into the economic picture, and the inferences which some in the industry have drawn from them "have raised a great deal of concern."

Imports evaluated.—The OGD now is attempting to evaluate the circumstances surrounding oil imports, he said, but warned against the dangers of precipitate action "before making dead sure of just what we were facing and where we probably would wind up if we adopted one line in preference to another." In this connection, he explained, OGD cannot look just at the immediate situation but must project its thinking 5 to 10 years into the future.

Discussing the British curb on American-company operations, Stewart told the subcommittee the effect of the action is not yet understood nor is there, he said, any finality about the situation.

He expressed the hope that the present talks would develop a "real understanding and sound basis on which we can all go forward with the least possible damage to our common good and future security," and told Harris:

British angle.—"If the British action, as finally worked out, is not too drastic, I believe we need not fear economic pressures of greatly increased imports into this country and can see imports reduced to that very desirable level which would serve to supplement but not supplant domestic oil."

Stewart touched briefly upon the expansion of natural-gas consumption, saying that while it was cutting into demand for fuel oil on the Pacific Coast it will not materially affect the situation in the East, although the future increase in demand for fuel oil may be limited.

Noting that his appearance at the hearing marked the completion of 30 years' service in the Government, Harris had Swanson explain the basic factors in the situation—production, reserves, imports, etc.—and pressed him for an answer to the paradox of statements that the industry had not been hurt by imports when production allowables had been cut sharply and independent producers were complaining.

Swanson explained that, while some small refineries had been forced to close down, the industry as a whole was in a very satisfactory position and said the cutbacks in production reflected a situation which had been previously developed in 1948 when aboveground stocks were increased. Imports do have an effect, of course, he said, but inventories have been reduced to the minimum of safety and "we are reaching a position where we are needing more oil" which will necessitate increases in allowables.

Policy.—From this, Harris went into the question whether the Government has any established policy respecting petroleum.

"Oh, yes," Swanson responded.

"What is it?" Harris asked.

"I cannot tell you—in detail," said Swanson.

However, he said more seriously the agencies concerned with oil have in mind the objectives of petroleum policy as outlined in Harris' bill but they have never been put in documentary form.

"The policy, then," Harris com-

WATCHING WASHINGTON

Bertram F. Linz

Oil for War

Defense officials apparently are prepared to write off the Middle East as a source of oil in the event of another war and are basing their planning entirely upon Western Hemisphere production.

Their belief that we will have to be self-sufficient in another emergency may have considerable influence upon any action taken by the administration to deal with the problem of imports, currently more or less in abeyance pending the outcome of the British-American oil talks.

The military viewpoint was made known some months ago by Defense Secretary Louis Johnson in a letter to Sen. Lyndon Johnson of Texas, a member of the Senate armed services committee.

The secretary said that military estimates of petroleum requirements in the event of war were, of necessity, secret, but his letter indicated that there has been no reduction in previously disclosed estimates that war would require at least 2,000,000 bbl. daily of oil above civilian needs. And, he said, rationing of civilians could add only a limited volume to military supplies without cutting deeply into the productive capacity of the country.

Secretary Johnson was guarded in his discussion of the military outlook, but he did say significantly that if our commitments under the Atlantic Pact are increased the holding of Europe in war, with the loss of the Middle East, would make for very difficult problems of oil supply.

Big versus Bigger

Justice Department officials have said repeatedly they do not intend to prosecute any corporation simply because it is big, but recent statements indicate that if they find any company reaching a size where it might exert monopoly control it will be a matter for suspicion at least, if not action.

In a statement which might well refer to the oil industry, Assistant Atty. Gen. Herbert A. Bergson, head of the Antitrust Division, recently pointed out that "certain industries are of such a nature that the companies which comprise them must be big in a quantitative sense if they are to operate efficiently."

In such cases, he said, the size of the companies would not render them liable under the antitrust laws, so long as they actively competed with each other and did not engage in collusive or restrictive practices.

But at the same time Bergson emphasized that a big company is in a better position to apply monopoly power than a small one and that court decisions have defined monopoly power as the "ability" to impose unreasonable restraints.

Under that philosophy, any company which stood out above its nearest competitor might be charged with possessing monopoly power, and while Bergson said no case has ever been brought against a company which had not asserted its power he indicated the department would act if any complaint was received falling within the court's broadened definition.

Sterling-Peso Trouble

Britain is finding that her trade agreement with Argentina, which knocked American oil companies out of the market, is not proving as good a bargain as anticipated and is expected to make demands for some changes when negotiations are opened late this month for renewal of the arrangement, which is due to terminate at the end of June.

Britain has been able to get meat at low prices—Argentina is still delivering on the predevaluation basis of the pound. She has sold a lot of oil—apparently more than expected. But British companies doing business with Argentina have been unable to secure remittances of their profits.

All of the difficulties stem from Argentina's desperate shortage of sterling—dollars as well—which is the result of over-spending. The Peron government last year made an attempt to straighten things out by cutting back on military spending and putting the country on a more agricultural basis, but retreated before the protests. The fact that meat has been delivered to Britain since last September at former prices is evidence of the seriousness of the situation.

When the negotiations open it will become apparent whether Britain will take advantage of the situation to insist on continued deliveries of meat at favorable prices or will take a longer range view and try to work out some way of helping Argentina to increase exports and thus get sterling with which to buy British goods, possibly through a credit or advance payment.

mented, "is to approach problems as they arise."

"Keeping in the back of their minds the objectives as they have been outlined in the bill you introduced," Swanson amplified.

Ban in Effect

U. S. officials still hope to ease terms of sales curb

WASHINGTON.—Britain's curb on sterling-area sales of dollar fuel oil and gasoline went into effect last week as officials of 10 affected companies individually discussed the situation with British officials in the hope of securing some alleviation.

The company men met with the British representatives after a lengthly session at the State Department at which the matter was reviewed. A State Department representative was said to be sitting in on the meetings as an observer. When all of the companies have had their day with the British officials another meeting is slated at the department at which an effort will be made to work out a common "platform" on which the American delegation can stand when formal talks are resumed.

Britain's refusal further to delay application of the order, originally set to go into effect January 1, was reported in Washington to have been based upon the contention that all plans had been made and further deferment was out of the question.

Hugh A. Stewart, director of the Oil and Gas Division, declined to discuss the matter in detail before the House interstate commerce oil subcommittee and would say only that conversations were going on out of which he hoped some acceptable proposals would develop.

State Department officials were represented as feeling that the American companies could not operate under the "incentive" proposals put forth by the British, but did not indicate that they had yet framed any alternative suggestions. However, as a result of further meetings with company officials, it is probable the United States will have new proposals to offer when the talks are continued.

Military Demands

WASHINGTON. — Approximately 5,000,000 bbl. of motor gasoline will be required by the Army during the fiscal year which begins next July 1, at an estimated cost of $25,327,232, for its operations in the United States and abroad. The estimated consumption will be about 4,750 bbl. less than expected for the current fiscal year.

Estimates submitted to the House appropriations committee show that the Army also will use in the neighborhood of 80,000 bbl. of kerosine,

at a cost of $364,663; 2,204,000 gal. of solvents costing $409,988; 1,581,000 bbl. of diesel engine fuel at a cost of $3,919,518; 133,850 bbl. of fuel oils at $297,398; 143,000 bbl. of engine oil at $3,181,380; 1,481,000 gal. of universal gear lube at $970,838; and 3,522,000 lb. of greases at $279,848.

Testimony before the committee indicated that while the Army uses a considerable quantity of diesel fuel it has not yet looked into the possibilities of reported recent developments which will greatly increase power and reduce smoke of which Rep. Harry R. Sheppard of California said The Texas Co., Standard Oil Co. (N. J.), and the Shell group are attempting to secure exclusive use.

Army officials told the committee that if the new product is developed it would take at least a year for the department to make its own tests and revise its specifications, explaining it would have to be tested out in the armored equipment, to make certain that it would give proper service in the field.

New Oil Investigation

FTC subpenas records of three companies for closed-door probe of "restrictive agreements" in operations abroad

WASHINGTON.—A Federal Trade Commission investigation of the activities of United States oil companies operating abroad was revealed to be under way last week when it became known that subpenas had been issued to three companies calling for their records on overseas operations.

Commission officials refused to discuss the probe, which was initiated by its investigative staff after months of preliminary inquiry. But following the publication of newspaper reports that it was under way it admitted that Standard Oil Co. (N.J.), Gulf Oil Corp., and Socony-Vacuum Oil Co., Inc., have been served with subpenas "requiring that certain of their records be submitted to the commission by March 13." It also made public the resolution calling for the inquiry.

Closed doors.—For the present, and probably for some time to come, the probe will be conducted behind closed doors. There are no plans at present for public hearings, although they will follow, it is understood, if any evidence of international cartel activities is uncovered by the investigators.

It is expected that, on the basis of information developed by the study, the commission will put the results of its investigation into one of its "economic reports" to Congress. But it was intimated that if any evidence of illegalities is uncovered prosecutions under the Federal Trade Commission act or other antitrust statutes might follow.

The only explanation given at the commission for the secrecy which had surrounded the inquiry, which was ordered some weeks ago, is that it is not being conducted on the basis of a formal complaint. Apparently there was an agreement that it was not to be discussed.

Basis for probe.—The basis and scope of the investigation was disclosed in the formal resolution adopted by the commission.

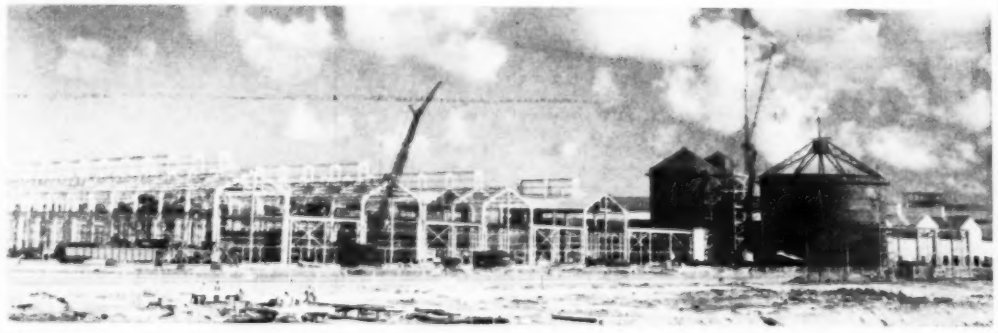
Pointing out that the petroleum industry "is one of the largest and most important industries" in the United States, and is "very highly concentrated," with the preponderance of total assets, proved reserves, crude production, and refining capacity held by a relatively few large companies, the resolution said:

"It is reported in authenticated, secondary sources that over a long period of years American petroleum companies operating in foreign countries have entered into restrictive agreements among themselves and with petroleum companies of other nations, many of these agreements having reportedly been recently extended and reinforced . . . and such restrictive agreements are reported to have the effect of restraining trade and of affecting prices of petroleum and petroleum products in the United States.

"This problem has been intensified by the importance of recent discoveries of oil in foreign nations," it was added.

On the basis of these findings, the commission invoked the authority of the Federal Trade Commission Act "to make an investigation of agreements entered into by American petroleum companies among themselves and with petroleum companies of other nations in connection with foreign operations and with international trade in petroleum and petroleum products and of the relationship of such agreements to domestic trade in and pricing practices of the American petroleum industry."

The records demanded of the companies include the recent Iraq petroleum agreement the 20-year arrangement by Standard and Socony for purchase of crude from Anglo-Iranian Oil Co., and various foreign-marketing arrangements. The commission also is said to have some interest in concession arrangements but it could not be learned whether such matters would be inquired into immediately.



FIRST TO USE GAS.—Shown here is the Point Comfort Works of Aluminum Corp. of America, now under construction at Port Lavaca, Tex. Instead of utilizing hydroelectric power in accordance with the practice at Alcoa plants elsewhere in the United States, the Point Comfort Works will operate with natural gas. The plant will be served by gas lines including a 38-mile, 8 and 10-in. line from Francitas field and through a submarine system connecting wells in Matagorda Bay.

Companies baffled.—In New York, officials of the companies involved were at a loss to understand the action of the commission. Representatives of two companies said they were "completely baffled" by the move.

Company officials pointed out that most of the documents subpenaed have been made public at various times, some in testimony before congressional committees.

There was speculation over what called forth the somewhat unusual action by the trade commission. It was reported in New York that the Department of Justice did not regard the FTC investigation favorably.

GULF COAST

Louisiana Allowable Cut

Reluctant commission indicates reduction in output may not be permanent, fixes production for one month only

NEW ORLEANS. — The Louisiana Conservation Commission last week cut 40,000 bbl. daily off what would have been the normal March production.

Commissioner S. L. Digby let it be known this move was made reluctantly, and by fixing the allowable for only 1 month in advance, the commission indicated the reduction may not be permanent.

"We are unhappy over the prospects of reducing production at the expense of producers who are eager to produce more, consistent with conservation, when the situation is largely contributed to by the influx of foreign oil."

With this statement Digby explained officially, for the first time, why Louisiana increased its production month after month in 1949 while other states, notably Texas, cut their crude output by considerable amounts.

The commission's action in setting the allowable only for March, a deviation from normal practice, together with Digby's remarks indicated the state intends to make a detailed analysis of the imports problem before setting April allowables. April allowables will be determined after a special hearing in mid-March.

The cut in the state's allowable will be accomplished by changing the production by depth brackets back to the July 1949 figure. (In Louisiana individual wells are prorated by setting producing rates on the basis of the depth at which the well is producing).

The present gross allowable is 577,000 bbl. Actual crude production is around 541,000 bbl. Thus, the allowable slash will bring actual production down to about 500,000 bbl. daily.

Imports criticized.—Digby told those present at the hearing that he doesn't yet know "if an excess of oil is being imported."

"But I do know enough to say that it is affecting domestic production, not only in crude oil, but in oil products," he said. "I have had many independent producers express adverse views to reducing the local procedure when the necessity is brought about by foreign oil."

He added that he favors having the industry work out some suitable agreement rather than having the question settled by law.

Emergency cut denied.—The commission denied a request of Esso Standard Oil Co. for an emergency cut of 25,000 bbl. daily in the state's crude-oil production.

Cecil Morgan, Esso vice president, had based his request on "alarmingly high" storage in the state resulting from unseasonably warm weather on the Eastern Seaboard.

In refusing the request, Digby said the company's stocks on hand as of last December filled only 39 per cent of its available tankage. (Conservation Department records show that Esso and its associates have steel-tank storage for 7,000,803 bbl.)

While relating figures on Esso's oil stock situation, the commissioner stated that stocks for the state as a whole had dropped 400,000 bbl. during the year 1949. Moreover, he added, from the high month of stocks (June) until December the decrease was 2,000,000 bbl.

Esso Standard's urgent request for a cut in allowables was backed up at the hearing by four major oil companies and one independent. They were: Phillips Petroleum Co., Cities Service Oil Co., Magnolia Petroleum Co., The Texas Co., Continental Oil Co., and W. H. Talbot. Talbot said he was producing 6,000 to 7,000 bbl. monthly which he couldn't market and that "we've got to cut back if we are going to stay in the oil business."

Not all purchasers backed Esso's stand, however. Shell Oil Co. and Gulf Refining Co. both upped their nominations slightly. Continental Oil Co. and The Texas Co. asked for the same amount of crude as at the hearing 2 months ago.

1948 AND 1949 CRUDE PRODUCTION FOR FIVE LEADING OIL STATES

	1948	1949	Change from 1948 (bbl.)	Change from 1948 (%)
Texas	903,318,000	746,244,000	—157,074,000	—17
California	340,089,000	334,484,000	— 5,605,000	— 2
Louisiana	181,181,000	191,409,000	+ 10,228,000	+ 6
Oklahoma	154,032,000	150,003,000	— 4,029,000	— 3
Kansas	110,886,000	100,187,000	— 10,699,000	—10

Oil Wells in Houston

HOUSTON.—As the result of a large annexation program, this city which has long been known as a major oil center, now has producing oil wells within its city limits for the first time.

Along with 102,000 people and 79 square miles of land, Houston has taken in 65 oil wells. The wells are located in South Houston and Eureka fields.

South Houston field was discovered in 1935 and produces from around 3,800 ft. There are 76 producing wells in the field (51 in the city limits). The field averaged 3,880 bbl. of oil daily last year. Operators include Stanolind Oil & Gas Co., Dick Schwab, H. E. Williams, Robert Omera, and R. A. Irwin.

Eureka field, with its 14 wells, is located wholly within the city limits. It was discovered in 1934 and produced an average of 887 bbl. daily in 1949. Operators in the field include Houston Oil Co. of Texas, C. N Housh, Bybee Synnott, McGehee Oil Co., and Jack W. Frazier.

Research Lab Session

STATE COLLEGE, Miss. — The fourth summer session of Gulf Coast Research Laboratory will be held June 6 to August 25 at Ocean Springs, Miss.

The laboratory is operated by the Mississippi Academy of Science, Inc., and will have Dr. R. L. Caylor, Delta State Teachers College, as summer director. A request is before the present session of the state legislature to erect a marine biology laboratory and dormitory facilities at the site.

Four-Field Study

SHREVEPORT.—The newly formed Louisiana Secondary Recovery Advisory Committee has selected four state fields for secondary-recovery studies.

The fields are Shreveport, Caddo-Pine Island, Rodessa, and Ashland. Reports on the studies will be made at the next meeting of the group April 18 in Shreveport.

The following committees were named to conduct the studies. Shreveport field: W. C. Fullilove, Jr., R. E. Allison Drilling Co., chairman and

R. S. Waterman. Caddo-Pine Island: J. A. Walker, Magnolia Petroleum Co., chairman; B. L. Francis, The Texas Co.; W. D. Beach, Gulf Refining Co.; F. L. Nelson, Stanolind Oil & Gas Co.; and W. B. Harris, Rodessa: R. O. Garrett, Arkansas Fuel Oil Co., chairman; G. C. Hollinger, Carter Oil Co.; Ben F. Carter, Union Producing Co.; and D. W. Akins, Jr., Ohio Oil Co. Ashland field: R. B. Cater, Jr., Atlantic Refining Co.

Four committee members were appointed in a general advisory capacity to assist the field committees. These men are B. C. Craft, Louisiana State University; James H. Tillery, Jr., Louisiana Department of Conservation; Gladstone Stewart, Jr., Shell Oil Co.; and A. L. Vitter, Jr., The California Co.

(For details of the organization of the committee, see The Oil and Gas Journal, February 2, page 30).

SOUTHWEST

Critical Wildcats

Four tests being watched to see if reef fields in Scurry County area are connected or are actually separate pools

D. H. Stormont

SNYDER, Tex.—A group of wildcat tests now nearing critical depths may soon throw light on the prospects that the several Canyon reef pools of Scurry County, now classed as separate fields, may connect into a common reservoir and extend into adjacent counties.

This activity is taking place in an area that is already approximately 40 miles from the farthest-southwest producing well to the farthest-northeast producer. The Scurry County reef fields are now producing approximately 52,000 bbl. daily from about 450 producing wells, and more than 180 wells are drilling currently.

Borden link sought.—On the southwest side of the trend, the potential producing area has been extended more than 5 miles by George P. Livermore, Inc., et al 1 Reinecke, in Section 53, Block 25, H&TC Survey, Borden County, just west of Scurry County. This extension came in while two tests were nearing pay depth in an attempt to fill in the gap between the nearest wells in the Sharon Ridge Canyon pool, Scurry County, and the Amerada 1 Von Roeder, across the line in Borden County.

(For details of the Livermore and Amerada wells and the relation between them, see the Exploration and Drilling section, page 219 of this issue).

The tests attempting to link Sharon Ridge with the Von Roeder production are Warren Oil Co. 1 Reynolds, SW NE Section 101, Block 25, H&TC Survey, about 1½ miles west of the nearest Sharon Ridge well but still in Scurry County, and R. E. Smith 1 Thompson, SW SW Section 102, same block and survey but across the line in Borden County.

The Smith 1 Thompson is ¾ mile east of the Amerada producer, but about 1½ miles southwest of the Warren test. If both produce, they will just about link up Sharon Ridge with the Von Roeder production. Smith 1 Thompson was drilling below 6,700 ft. within about 100 ft. of the critical depth at last report; while the Warren 1 Reynolds on February 20 was fishing at 5,125 ft., total depth.

Kent County tests.—On the other end of the producing trend, two wildcats are drilling which will throw light on the possibility of linking together the Chapman-Cogdell producing area in Kent County (farthest-north production to date) with the north end of the North Snyder area in Scurry County, nearest production south of the Chapman-Cogdell area. There is at present about a 7-mile gap between the two.

The two tests attempting the link here are Castleman & O'Neill et al 1 Feldman-Pardo, SW Section 651, Block 97, H&TC Survey, and Standard Oil Co. of Texas 2 West, SW Section 268, Block 2, H&TC Survey. The 2 West is about 3½ miles east of the northernmost production in the North Snyder pool, and nearly 7 miles south of the Chapman-Cogdell area. It apparently missed the reef and this week was testing an unidentified limestone at 7,133 ft. The Castleman & O'Neill test is about 2 miles south and a mile west of the nearest well in the Chapman-Cogdell area, and 4 to 5 miles north of the nearest North Snyder production. It was drilling below 6,800 ft. this week.

In the Chapman-Cogdell area of Kent County, both north and south offsets to the discovery *(see The Oil and Gas Journal, December 22, 1949, page 303)* look like sure producers. The north offset, Chapman & McFarlin 3 Cogdell, topped the reef some 25 ft. higher than the discovery. The south offset, Texas Co. 2 Fuller, is called at about 30 ft. lower than the discovery on the reef top. The reef top in the discovery was called at —4,365 ft., making the north offset about —4,340 ft., and the south offset about —4,395 ft.

Strawn pay, too.—Though largely overshadowed by the Canyon reef discoveries, there was considerable interest in the play for Strawn production along the east side of the main reef and at a greater depth.

This activity suggested that development drilling in the Strawn may come more rapidly than had been anticipated. One Strawn well was being put on the pump for final completion, after swabbing 462 bbl. in 36 hours. Another was drilling below 4,300 ft., and location for three new wells were announced.

The producer is Gene Goff et al 1 Rylander, NW NE Section 124, Block 3, H&GN Survey, about 1 mile northeast of Snyder townsite. The drilling well is L. H. Armer & G. H. Chizum 1 Lyons, NW NW Section 119, same block and survey, 3 miles north and a little east of the town.

The new locations announced were: L. M. Lockhart 1 Patterson, a northwest offset to the 1 Rylander, 467 ft. from south and east lines of the southwest quarter, Section 121, Block 3, H&GN Survey; I. Weiner et al 1 Chaffey, 977 ft. from the north line and 1,101 ft. from the east line of the northwest quarter, Section 181, inside the platted townsite of Snyder; and I. Weiner 1 Simpson, 282 ft. from the west and 467 ft. from the south line, Section 153, 1 mile south of the town of Snyder.

Establishment of a field engineering committee for the North Snyder-Sharon Ridge Canyon reef fields seemed likely soon. An organization meeting was held earlier this month, with D. V. Carter of Magnolia Petroleum Co. presiding, and a second meeting has been called for early in March.

Speculation about just how far north the present producing trend may go was stepped up by reports of an indicated Strawn pay discovery, about 15 miles northwest of the nearest production in the Chapman-Cogdell area of Kent County and around 30 miles north and a little west of the town of Snyder.

In west central Kent County, L. T. Lohman 1 Young, NW NW Section 98, Block "G," W&NW Survey, was reported to have had an encouraging drill-stem test in the Strawn pay at 7,350-7,372 ft. One report was that gas came to the surface in 9 minutes, estimated at 314,000 cu. ft. daily, and that on pulling the pipe, 5,100 ft. of 38°-gravity oil and 270 ft. of salt water was recovered. Another report claimed that when 18 stands of drill pipe had been pulled the well headed clean oil for about 15 minutes.

House Approves Tax Bill

AUSTIN.—The Texas house of representatives has passed and sent to the senate a bill raising by 10 per cent present taxes on oil and gas production and 17 other sources covered by the omnibus law of 1941. The bill is expected to get senate approval.

The administration-approved bill would result in almost $10,000,000 in

additional taxes on the oil and gas industry. Gov. Allan Shivers has asked that the tax increase be used to pay for state hospitals.

Severance taxes on oil and gas are included in the omnibus bill. In 1948 oil and gas brought tax income of approximately $96,000,000. The approximate $10,000,000 increase in revenue from the new legislation is based on the state's 1948 production. However, since Texas' oil production has declined during the past year, the amount may not be that high.

MER System Junked

Texas Railroad Commission studying three new formulas for prorating production in the future; decision expected soon

Leigh S. McCaslin, Jr.

SAN ANTONIO. — Flush-production fields, such as those in Scurry County, will suffer, and East Texas field and "poorer" fields throughout Texas will gain under a new oil-allowable method which is expected to be announced this week by the Texas Railroad Commission.

This is the opinion of many oil men who attended the monthly state-wide proration hearing here February 17.

Commissioner Ernest O. Thompson said flatly: "We're not going to keep the present (proration) system. That's out." However, he assured the operators that the present discovery allowable for encouraging wildcatting would not be tampered with.

Normally, the commission announces the allowable for the coming month shortly after the hearing closes. However, with a new formula under consideration, the group decided to postpone the announcement until some time this week. It is probable that the new proration method will be announced simultaneously with the March allowable.

On the margin.—Thompson justified the need for change by saying, "We're facing marginal production throughout the state with imports increasing and American oil cut off around the world. There is no place to market it but in the United States."

The present method of allocating oil production between fields is based on "most efficient rates" of production. These MERs are determined at individual hearings for each proratable field in the state. A large number of stripper fields are exempt from prorationing. By adding the total MERs to the stripper production it is possible to arrive at a figure representing the total amount of oil the state can produce daily without harming its fields. The present figure is slightly over 3,000,000 bbl. daily. The Railroad Commission then trims this figure to keep production within market demand. This is done by shutting the proratable fields down so many days per month. For example, during February the fields are allowed to produce at their MER only 15 days out of the month.

Many oil men present at last week's hearing urged that the commission withhold action until they had time to study the three proposals which were presented. Ira Butler, representing Amon G. Carter Foundation and York & Harper, Inc., summed it up by saying: "I feel that you're proposing to do something you've studied a long time while the operators have known it only a few hours."

Three formulas.—The three formulas advanced by the commission at the hearing were the "1947 yardstick," the "1942 yardstick," and "Formula No. 3."

The 1947 yardstick is based on acreage and depth. It was used by the commission to determine the production allowable of a field between the time the discovery allowable terminated and an MER was established. Under questioning by Maston Nixon, Southern Minerals Corp., Corpus Christi, it developed that this system would approximate the present production more closely than the other two formulas.

The 1942 yardstick is based on the same factors as the 1947 yardstick, but received little attention at the hearing.

Plan explained.—Formula No. 3 is an entirely new method and was described by Jack Baumel, chief engineer for the commission. Briefly, it would give all wells their daily marginal production, as provided by law, and distribute the remainder of the market demand on the basis of MERs.

Baumel explained the formula by using the current actual production of the state as an example. Current flow is 1,912,000 bbl. daily. From this would be subtracted 1,360,000 bbl., which is the statutory marginal allowance to all wells in the state. Next, 302,000 bbl., representing the MER on

UNUSUAL DRILLING PROBLEM.—When Carter Oil Co. staked location for its 1 Harrison, wildcat near Woodward, Okla., the company found it would have to take extra precautions to protect that city's water supply. The sandy soil in the area serves as a filter for the city's water, taken from 90-ft. wells drilled to a formation of nonpcrous red shale. To keep chemicals in the drilling mud out of the city's water, Carter replaced the open slush pit with steel tanks, cemented surface pipe below the red shale, and hauled all cuttings to a large pit dug more than a mile from the drilling site.

a 20-day basis for the East Texas field, would be subtracted. These two deductions would leave only 250,000 bbl. daily of proratable oil for distribution in the rest of the state on an MER basis.

The 1942 and 1947 yardsticks will work more in favor of flush fields than will Formula No. 3. Formula No. 3 would benefit "poorer" fields, and most particularly the East Texas field. East Texas field is currently producing about 215,000 bbl. daily. Under Formula No. 3 it would be raised to 302,000 bbl., an increase of 87,000 bbl. daily. On the other hand, flush fields such as those in Scurry County, would be cut 25 to 50 per cent from present rates.

West Texas hit.—Basis of a change in the allowable formula is the rapid rise of Scurry County production, and the urgent pleas of East Texas operators for higher allowables. Scurry reef producing wells currently have an allowable of 200 bbl. per producing day (120 bbl. on a calendar-day basis) while East Texas wells have a 20-bbl. allowable, or less than 10 bbl. on a calendar-day basis. East Texas operators call this unfair discrimination.

On the other hand, Scurry County producers call attention to the fact that 220 bbl. daily was the lowest MER figure submitted by any operator. They feel that a 200-bbl. allowable is not at all high when it is considered that many of the wells have over 400 ft. of net producing section.

Regardless of which of the three formulas is adopted, East Texas will be given the same number of producing days as the remainder of the state. East Texas field is currently producing 13 days while the remaining prorated fields produce 15 days. The commission made this promise after a large delegation from the East Texas area pleaded for the action.

In addition to the controversy between Scurry County and East Texas, there has been another angle involved. Regardless of which formula is adopted, it seems certain that overall production of sour crude will be reduced and that of sweet crude increased. Most of the sour crude is produced in the flush fields of West Texas. The diminishing market demand over the past year has caused these crudes to lose favor. With plenty of sweet crude available, refiners are trying to reduce their purchases of sour crude.

INDUSTRY AFFAIRS

Pending Merger

Wright says specific plan for absorbing Barnsdall Oil Co. now in preparation by Sunray; directorship is changed

Henry D. Ralph

A SPECIFIC plan for absorbing Barnsdall Oil Co. into Sunray Oil Corp. is being prepared, it was announced this week by Clarence H. Wright, president of Sunray and new chairman of the board of Barnsdall.

This confirmation of the reported merger followed immediately after consummation of a transaction whereby Sunray acquired approximately 800,000 shares of Barnsdall stock, close to 45 per cent of the shares outstanding. It was purchased for cash from Floyd B. Odlum, president of Atlas Corp., an investment company, for $56 per share or a total of about $44,800,000.

Barnsdall directors met immediately after the sale and received the resignation of Odlum and three of his associates — George H. Howard, L. Boyd Hatch, and Oswald S. Johnston. They were replaced by four directors representing Sunray — Wright, who was elected chairman of the Barnsdall board; L. W. Bennett, Sunray treasurer; Edward Howell, vice president and general counsel of Sunray; and Glenn J. Smith, a Sunray director.

C. H. WRIGHT

Plans under study. — Consolidation plans are now in the hands of attorneys and financial advisors for submission to the Securities and Exchange Commission and the directors of the two companies. They must then be approved by stockholders of Sunray and submitted to the other Barnsdall stockholders.

There are approximately 900,000 shares of Barnsdall common stock outstanding in addition to the 800,000 shares just purchased by Sunray. If these are bought at $56 per share it would require in the neighborhood of $50,000,000 cash. It is more probable, however, that Barnsdall stockholders will be offered Sunray stock in exchange. Sunray stock currently is quoted at about $12 per share.

Barnsdall employes already have been informed of the general merger plans and have been asked to cooperate in building a strong company on the combined operations. They were reminded that Sunray has an extensive history of absorbing other companies and that in almost every instance the employes of the merged concerns found equally good positions in Sunray.

Big concern. — Absorption of Barnsdall will make Sunray rank among the larger independent oil companies. It will have combined assets of more than $250,000,000, about 3,400 net producing wells, and current crude production of about 65,000 bbl. daily. Sunray has more than 900 employes and Barnsdall approximately 1,300.

Barnsdall is purely a producing company, while Sunray has crude production and also two refineries in Oklahoma and one in California with a combined capacity of close to 40,000 bbl. daily.

For the most part, the properties and operations of the two companies are expected to fit together well. Both companies operate extensively in Oklahoma, Texas, Arkansas, Louisiana, and California, with scattered interests in other states. Both have important production in the Canyon reef fields of Scurry County, Texas, and combined proven and unproven holdings of more than 3,000 acres in that county. Both companies also have production in Alberta, Canada.

Sunray's growth.—Sunray has grown rapidly during the past dozen years, in large part by purchasing small companies with good crude reserves and merging them with Sunray operations. These included the acquisition of Superior Oil Co. of Oklahoma in 1943; Darby Oil Co., with properties in Oklahoma and Kansas, in 1944; Bel-Air Oil Co. and Bell Oil & Refining Co., with extensive production in California and a refinery at Santa Maria, in 1946; and Transwestern Oil Co., with a substantial producing operation in Texas, in 1946.

In announcing that consolidation plans are under way, Wright stated:

"It may be several months before the proposed merger of the two companies materializes, but officials of both Sunray and Barnsdall are confident that very little trouble will be experienced in the matter of moving

the two employe groups into the same general office building in Tulsa and in combining and coordinating field operations in the general office, producing, land and exploration, pipe line, and other departments. In past situations of this kind, Sunray has absorbed, to a large extent, employes of companies merged.

"It is my honest conviction that combining Sunray and Barnsdall into a closely knit, well-integrated company will result in a most efficient organization for the continuance of oil development and that Sunray's position in the industry is well enhanced by this action."

Pension Pattern

Sinclair agrees to "most liberal" plan in industry

THE pattern for pension and sick-benefit plans for the entire oil industry may be contained in the agreement now pending between the Oil Workers International Union (C.I.O.) and Sinclair Refining Co. and Sinclair Oil & Gas Co.

If ratified by the union membership and by the stockholders of the parent Sinclair Oil Corp., the agreement will launch what is described as the most liberal plan in the oil industry. It is also said to be more liberal than the pension plans recently won by other unions from steel, automobile, and other industries.

The Oil Workers Union has announced that it will attempt to negotiate similar plans with other oil companies in which it has bargaining representation among employes.

The plan will apply to all employes of all branches of the two Sinclair companies, whether or not they are members of the union, including top executives.

Inauguration of the plan is contingent upon passage by Congress of H.R. 6000, a bill to increase social-security benefits by approximately 70 per cent, on the average. This bill has passed the House and is expected to pass the Senate during the current session. If the bill fails to pass, the Sinclair plan will be reopened for further negotiations.

The new Sinclair plan, like the one now in effect by the company, calls for contributions by both employes and employer to both the pension and sick-benefit programs, but the increased costs will be borne by the companies. Participation in both plans is voluntary, and employes must make individual applications to be covered.

Pensions. — A minimum pension of $125 per month at age 65 and after 20 years of service with the company is guaranteed under the plan. This is to include federal social-security payments, with the company making up the difference in order to bring total pensions to this minimum.

Most industry retirement plans are based on pensions of $100 per month and require 25 years of service.

The Sinclair plan includes a series of provisions whereby an employe may retire at an earlier age or with less service and receive a proportionate pension. Also, provisions to protect employes against loss of pension rights because of strikes, layoffs, or disabilities.

Sick benefits. — The present Sinclair sick-leave and hospital-insurance plan will be greatly broadened by the new contract.

It calls for full pay up to 5 weeks of illness, half pay up to 25 weeks, and additional sick-leave insurance designed to give an employe approximately 60 per cent, on the average, of his pay for a full year of illness.

In addition there are provisions for paying hospital costs and special medical and surgical fees for employes and their dependents, plus an accidental-death insurance policy.

If ratified and put into effect, the Sinclair plan will be published in detail. It is probable that the plan will receive wide study, as a number of other oil companies have already requested copies of it.

Big Business

Rapid expansion continues in natural-gas industry

NATURAL gas is big business and getting bigger by leaps and bounds.

In the past decade, and that includes the war years when expansion was limited, the gas operating revenues of the natural-gas companies reporting to the Federal Power Commission rose from something over $400,000,000 to nearly $1,000,000,000 and the total investment in gas-utility plant increased from less than $2,000,000,000 to nearly $3,500,000,000.

More concretely, between February 7, 1942, and February 1, 1950, the FPC granted 507 authorizations for pipe-line construction at an estimated cost of $1,876,726,000, and 142 of these projects involved a construction cost of $700,000 or more and provided an increase of 10,598,800 M.c.f. in daily capacity.

The expenditures covered by those certificates exceeded the entire investment in the gas plant of natural-gas companies at the beginning of the period, but 55 applications now pending before the commission call for expenditure of nearly half of the amount authorized in the past 8 years —$913,020,000 — and when completed will bring the total pipe-line network close to 45,000 miles.

Really big money has been invested in the construction of pipe lines and their necessary facilities. During the 8 years ended this month, for instance, projects of Tennessee Gas Transmission Co. had an estimated cost in excess of $309,000,000 and four applications it has pending will cost another $100,000,000. Texas Eastern Transmission Corp. projects cost nearly $209,000,000, and one now pending will add $64,000,000. The largest projects on which the commission has yet to pass are those of Texas-Illinois Gas Pipe Line Co., $165,273,000; Tennessee Gas Transmission, previously mentioned, and Atlantic Gulf Gas Co., $92,000,000.

Sun Case

Firm seeking more details on its alleged violations

PHILADELPHIA. — Atty. Gen. J. Howard McGrath has been called upon by Sun Oil Co., through federal court in Philadelphia, to name each refiner, distributor, or manufacturer of motor oils, lubricants, and automotive accessories, who allegedly complained he was denied access to the market.

Robert G. Dunlop, Sun president, announced that the move is an effort to speed an early trial of the exclusive-dealing charges against the company.

The Department of Justice filed the civil suit in January, charging Sun with violations of the Sherman and Clayton antitrust acts. The complaint charged that Sun has compelled approximately 10,000 independent service-station operators to enter into agreements requiring them to purchase petroleum products and various automotive accessories exclusively from Sun.

Dunlop said that the attorney general has been asked to give names, dates, and places of the alleged violations, and challenged McGrath to name the service-station operators he charges were denied opportunity to purchase petroleum products or automotive accessories from refiners or marketers of their own selection.

The company, in seeking clarification of references to Sun's gasoline sales in the complaint, asked the attorney general to state the total sales of gasoline made by each company marketing gasoline in the Sun market area for each year from 1928-48, inclusive, and requested the same information on sales of petroleum products other than gasoline, and on automotive-accessories sales.

Further, the company asked McGrath to indicate whether his figures reflect total annual sales to all classes of customers, or whether they are the total sales to independent service stations.

The firm also asked for the form and revision number of each contract alleged to be restrictive, and also sought specific information on all contracts not in the nature of a standard form.

World Production

Sharp curtailment in Venezuelan output reported; world crude production in December was at record high level

VENEZUELAN crude-oil production, which has been holding at record high levels the last 5 months, has dropped sharply in recent weeks. Preliminary estimates for February indicate a decline of nearly 12 per cent.

The sudden shift in the trend of Venezuela's output apparently was caused largely by the import cutbacks into the United States which were announced recently by five major companies.

Reports from Caracas said that Creole Petroleum Corp., leading Venezuelan producer, had cut its production by some 100,000 bbl. daily in the Lake Maracaibo area, with all of Bachaquero field closed in. Mene Grande Oil Co. was reported to have approximately 50,000 bbl. daily closed in in the Greater Oficina area.

Venezuelan production figures for the week ended February 6 show a total for the country of 1,409,000 bbl. daily. This compares to 1,456,000 bbl. daily the week ended January 30 and 1,465,000 bbl. daily the week ended January 23. In the week ended January 16 Venezuela reached another all-time record with 1,498,000 bbl. daily.

The January total from the preliminary reports approximates 1,470,000 bbl. daily. The February output is expected to be about 1,300,000 bbl. daily.

While Venezuelan output, as these reports show, has since declined considerably, world-wide production during the month of December was running at record-high levels in most foreign areas. The comparative figures for December are summarized in the accompanying tabulations.

During December, indicated total world production was below the previous month, however, because of lower output in the United States. December foreign production, overall, reached a new peak, but it was offset by the drop in the United States.

Production in the United States in December was down an estimated 188,500 bbl. daily, or 3.6 per cent, below November and 667,000 bbl. daily, or nearly 12 per cent, below December 1948.

The foreign total—excluding Russia and Eastern Europe, for which no reliable figures are available—rose slightly during December to a new high of more than 3,700,000 bbl. daily.

Most of this total foreign increase was due to gains in production in several countries of the Middle East.

VENEZUELAN PRODUCTION BY MAJOR FIELDS
(More than 5,000 bbl. daily)

	Dec. (bbl.	Nov. daily)
Eastern Venezuela		
Quiriquire	51,628	65,034
Temblador	9,757	9,690
Oficina	32,481	34,939
Jusepin	27,806	28,552
Mulata	19,890	19,491
San Joaquin	10,188	10,371
Leona	5,514	5,171
Pedernales	8,885	8,221
Tucupita	7,865	8,150
Nipa	36,780	36,051
Las Mercedes	16,392	16,814
Taman	6,633	4,935
San Roque	5,983	5,647
Santa Barbara	20,330	20,808
Tucupido	6,962	7,738
El Roble	4,846	5,089
Guario	5,329	6,518
Guico	11,229	10,873
Guara	61,039	64,202
Chimiri	32,465	30,380
Western Venezuela:		
Cabimas	94,857	79,854
Lagunillas	345,301	348,624
Tia Juana	165,156	165,215
La Paz	149,767	153,208
Sibucara	7,044	6,147
Bachaquero	107,733	107,236
Mene Grande	49,521	48,496
Pueblo Viejo	7,422	4,894
El Cubo	12,582	12,040
Mara	88,162	86,050

Venezuelan Production by Companies*

	Dec. (bbl.	Nov. daily)
Creole	665,762	670,497
Shell	448,129	443,083
Mene Grande	189,672	193,913
Socony-Vacuum	38,459	39,043
Texas	28,601	27,091
Mercedes	16,931	16,803
Sinclair	13,533	13,913
Atlantic	17,286	14,492
Pantepec	11,852	11,364
Phillips	7,668	7,389
Richmond	1,174	240
British Controlled Oilfields	1,134	1,206
Guasare	122	130

*Venezuelan Government figures reflecting lease, not operated, production.

That area as a whole went to a new record in December of nearly 1,490,000 bbl. daily. This was slightly above the previous high of last April.

Iran's production reached approximately 604,000 bbl. daily in December, about 2 per cent above the previous month. Slight increases were shown in Saudi Arabia and Iraq. Production in Qatar did not officially commence until January.

Arabian American Oil Co. expects its output in Saudi Arabia during 1950 to hold at around 450,000 bbl. daily. The January figure for this country, since issued, shows a daily average of 449,933 bbl.

This company has been particularly affected by the market difficulties resulting from the world dollar short-

CRUDE-OIL PRODUCTION
(Thousands of barrels daily)

Country—	Dec. 1949	Prev. month	Dec. 1948
Western Hemisphere:			
Argentina	65.0	65.0	70.6
Bolivia	2.1	2.3	1.9
Brazil	0.4	0.4	0.2
Canada	56.9	62.4	40.2
Chile	2.2	0.5	
Colombia	82.4	77.9	80.5
Cuba	0.6	0.6	0.3
Ecuador	7.2	7.1	7.2
Mexico	166.8	173.5	160.7
Peru	40.5	40.5	39.5
Trinidad	56.5	56.5	54.8
Venezuela	1,440.3	1,439.2	1,362.5
Total	1,920.9	1,925.9	1,818.4
Europe and Africa:			
France	1.3	1.3	1.0
French Morocco	0.4	0.4	0.3
Germany	18.4	17.8	13.5
Italy	0.2	0.2	0.2
Netherlands	13.4	13.2	11.4
Egypt	44.9	42.1	38.9
United Kingdom	0.9	0.9	0.9
Total	79.5	75.9	66.2
Middle East:			
Bahrein	30.3	30.2	30.0
Iran	603.6	591.6	547.0
Iraq	122.2	120.0	53.1
Kuwait	271.1	276.4	211.4
Saudi Arabia	462.4	454.5	466.4
Total	1,489.6	1,472.7	1,307.9
Far East:			
British Borneo	72.0	72.0	62.0
Burma	0.5	0.5	0.6
China	1.5	1.5	1.8
India	5.5	5.5	5.3
Indonesia	120.0	117.5	94.8
Japan	4.3	4.2	4.8
New Guinea	4.8	4.8	4.0
Pakistan	2.5	2.5	1.2
Total	211.1	208.5	174.5
Total, foreign less Russia and E. Europe	3,701.1	3,683.0	3,367.0
Russia and E. Europe:			
Austria	22.0	22.0	17.5
Romania	84.0	84.0	95.0
Yugoslavia	1.2	1.2	1.1
Russia	730.0	730.0	615.0
Other E. Europe	16.0	16.0	14.0
Total	853.2	853.2	742.6
Total, foreign	4,554.3	4,536.2	4,109.6
United States	5,021.0	5,209.5	5,688.0
World total	9,575.3	9,745.7	9,797.6

Figures are authoritative for the Middle East and the more important countries of the Western Hemisphere and Europe. Estimates have been made in some cases based on previous months. Previous-month figures have been revised where better information was available. No up-to-date figures are available for Russia and Communist-controlled Eastern Europe.

TREND SINCE JANUARY 1, 1949

	W. Hemisphere less U. S.	Middle East	Foreign less Russia & E. Europe
January	1,706.4	1,358.2	3,308.6
February	1,688.6	1,400.2	3,340.2
March	1,625.9	1,393.4	3,280.2
April	1,678.2	1,485.2	3,488.3
May	1,768.5	1,417.6	3,472.8
June	1,768.8	1,375.7	3,433.3
July	1,800.2	1,338.7	3,428.1
August	1,859.9	1,323.9	3,473.1
September	1,931.8	1,351.5	3,574.9
October	1,921.6	1,428.6	3,645.9
November	1,925.9	1,472.7	3,683.0
December	1,920.9	1,489.6	3,701.1

Service: High-Pressure Big-Volume Storage of Propane

Stress-Relieving Facilities

- Chicago—vessels 13-ft. 6-in. in diam. by 83-ft. long in one charge.
- Birmingham—vessels 13-ft. in diam. by 79-ft. long in one charge.
- Greenville—vessels 13-ft. 6-in. in diam. by 63-ft. long in one charge.

Longer vessels may be stress-relieved in two or more charges.

(The vessel shown above is 106-in. in diam. by 44-ft. 3⅞-in. long, designed for a pressure of 200 lbs. per sq. in.)

This 21,600-gal. propane tank is outward-bound from our Chicago plant for the Farmers Union Cooperative Association at Wahoo, Nebraska. As it goes rolling by, you are impressed by its size and weight—without realizing the full story behind that impression of massive strength.

The highlights of that story are contained in a review of the skill and facilities we use in fabricating vessels for high pressure service. Some of the services we offer include welding to code requirements, X-raying, stress-relieving and the furnishing of corrosion-resistant linings. We also have plate heating facilities at our Birmingham plant for fabricating refinery vessels with heavy wall thicknesses. Write the nearest office for a quotation the next time you need steel plate structures.

CHICAGO BRIDGE & IRON COMPANY

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Atlanta, 3.....2154 Healey Bldg.
Birmingham, 1.....1536 North 50th St.
Boston, 10.....1025—201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Havana.....402 Abreu Bldg.
Houston, 2.....2119 National Standard Bldg.
Los Angeles, 14.....1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3...1615—1700 Walnut Street Bldg.
Salt Lake City, 4.....525 West 17th South St.
San Francisco, 11..1254—22 Battery Street Bldg.
Seattle, 1.....1325 Henry Bldg.
Tulsa, 3.....1606 Hunt Bldg.

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age. It is expected that Aramco's Ras Tanura refinery will average about 75,000 bbl. daily in runs during 1950 against about 127,000 bbl. daily in 1949. The January report shows runs averaging 96,979 bbl. daily.

Germany showed another production increase in December to reach about 18,400 bbl. daily. Additional production has raised the output in Netherlands slightly. Some yet-unevaluated but apparently small discoveries in southern France are expected to show in the total for this country in later months.

Venezuela's production in December showed little change from the previous month. The total of 1,440,323 bbl. daily reported by the ministry, however, was considerably above the 1948 high of 1,382,800 bbl. daily in October.

Chile's production of about 2,200 bbl. daily was in advance of the first commercial shipments from Tierra del Fuego, which began the middle of February. Canada showed a drop of about 5,500 bbl. daily. Preliminary figures indicated a slight decline in Mexico's production in December.

Report on Reserves

Proven areas hold 30-year supply and the upward trend is continuing, A.I.M.E. told. Reports by country featured

Dahl M. Duff

NEW YORK.—The world's reserves of petroleum now seem to be building up and at present approach a 30-year supply when related to consumption, James Terry Duce, vice president of Arabian American Oil Co., said last week at the meeting of the Petroleum Branch of the American Institute of Mining and Metallurgical Engineers here.

The upward trend of world reserves is likely to continue, Duce said. The new exploration work now under way in various areas is the forerunner of additional production potential to come.

Middle East.—Duce's remarks on world reserves were made at the end of a talk reviewing production highlights in the Middle East over the last year. He gave no specific figures on reserves. As for the Middle East, he said reserves in the area had increased considerably but that he would hesitate to say how much.

His discussion of development in the Middle East was one of six presented on the Petroleum Branch program at the 170th general meeting of the A.I.M.E. These six papers summarized 1949 operations in all foreign areas.

Drilling last year in the Middle East brought the total number of wells drilled in the area to 711, Duce said. Kuwait, producing about 90,000,000 bbl. last year, showed the greatest gain in the Middle East in production. Iran's production reached a record 204,000,000 bbl. Other totals were Saudi Arabia 174,000,000 bbl., Iraq 28,000,000 bbl., and Bahrein 10,985,000 bbl.

Two discoveries were made last year in Saudi Arabia, at Ain Haradh and at Fadhili. The one at Haradh is the better of the two, Duce said. One well was drilled during the year with inconclusive results on Bahrein Island.

Dukhan field on Qatar Peninsula, which made its first commercial shipment early in the year, appears to be a large field and further production will be developed. In the Basrah area of Iraq, Duce said, discoveries were made at Nahr Umr and at Zubair, and a third well at Ratawi is now about 11,300 ft. All three of these look like major discoveries, he said. At Ain Zalah in Iraq, some additional drilling was done, and potential of the area is now about 30,000 bbl. daily.

Canada.—Another of the outstanding foreign reviews was that on Canada by Vernon Taylor of Imperial Oil, Ltd. He said it is not unreasonable that in the next few years western Canada will develop reserves of the order of 5 billion barrels, which will make Canada self-sufficient in petroleum.

Only about 15 per cent of Canada is favorable for oil accumulation, since 49 per cent is covered by the Canadian Shield, 13 per cent by thin sediments, and 23 per cent by mountains and igneous rock. One of the slides with Taylor's talk showed that Texas, Louisiana, Oklahoma, and California can be fitted into the western Canada sedimentary area.

During 1949, a total of 12 discoveries were made in western Canada. Of these, the most significant appears to be Golden Spike with 595 ft. of saturated sand. Normandville, 225 miles from the nearest production, is not yet evaluated. This also is true of other last year's discoveries.

The other discoveries last year were: Barrhead (heavy oil), Bon Accord, Excelsior, Joseph Lake, Whitemud, Stettler, Campbell, British Empire, Casagama, and Simmons. The 203 wells drilled last year resulted in 12 new oil discoveries, 4 oil outposts, 22 gas fields, and one gas outpost.

Some 100 Canadian and United States companies are working in Alberta, Saskatchewan, and Manitoba, Taylor said. At the end of the year, there were 105 geophysical parties in the field, 81 seismograph, 23 gravity, and 1 magnetometer. This represented an increase of 44 parties during the year and made Alberta second only to Texas in exploration effort.

Taylor said that there was a small amount of activity in Saskatchewan during the year, largely geophysics and core drilling. He predicted considerable drilling in this province in 1950 because of lease requirements.

Canada's 1949 production met about 20 per cent of the country's requirements. The total MER of Canada was estimated at 117,000 bbl. daily at the end of the year against production of 58,025 bbl. daily. The Leduc-Woodbend MER was given as 35,000 bbl. daily against 27,500 bbl. daily production; Redwater 60,000 bbl. daily against 15,000 bbl. daily, and Golden Spike, 2,000 bbl. daily against 600 bbl. daily.

Taylor said that some of the 22 gas discoveries made last year were of considerable significance. At the beginning of 1948, gas reserves were about 4 trillion cubic feet, and it is now considered that gas reserves amount to about 7 trillion cubic feet Taylor pointed out Alberta's policy against export of gas has prevented development of these discoveries but that, with the new discoveries, the province now has under way a hearing to allow export of gas through a projected pipe line to the Pacific Coast.

Latin America.—Data on 1949 activities in Latin America was presented by R. B. Gilmore, DeGolyer & MacNaughton, Dallas. Last year, production in Argentina at about 63,000 bbl. daily was down about 2 per cent with 70 per cent of the total still coming from Comodoro Rivadavia. The new discovery at Caleta Olivia, he said, may be developed into an important area.

Brazil's total production last year was 109,077 bbl. During the year, 13 oil wells, 1 gas well, 4 dry holes and 5 stratigraphic tests were drilled. Chile reached a production of about 2,000 bbl. daily at the end of the year. Gilmore said officials of the government's Corp. de Fomento had stated that the 16 productive wells of the 29 drilled could produce 10,000 bbl. daily. Chile has contracted to sell oil to Uruguay, and is now reported to be negotiating with Argentina.

Last year's only important discovery in Colombia was Texaco's Tetuan wildcat. The country produced 29,700,000 bbl. of crude, not including 819,000 bbl. of condensate. Union Oil Co. decided to withdraw from Paraguay after drilling five dry holes, Gilmore said. Additional drilling in Mexico brought the total of wells to about 900 flowing and 160 pumping. Twenty new wells were completed in the Reynosa area, and the Isthmus pipe line is now about one-fourth completed.

Gilmore pointed out that produc-

tion in Venezuela last year showed a slight decline. Reserves increased more than the amount of production, he added. Peru's production was little changed, but consumption in this country is rising rapidly and more reserves are needed.

Germany.—Developments in Germany, Netherlands, and Egypt were discussed by Brandon H. Grove, Socony-Vacuum Oil Co., Inc. Germany had its best year since the war with seven discoveries, three of them classed as major with 20,000,000 bbl. or more ultimate production estimated. The most significant aspect of the German development, Grove said, is that it is likely to continue. He said the German industry last year tested the concept of anticlinal structures between the salt domes and that the drilling resulted in two discoveries.

Netherlands.—For Netherlands, Grove read a summary of information prepared by Bataafsche Petroleum Mij (Shell) which said that drilling in the vicinity of Schoonebeek is now taking place in two separate offset areas at the east and west end of the field.

Production has been found east of the field in an extension of the German Ruehlertwist field, and a gas discovery was made at De Wijk, about 25 miles west of Schoonebeek. The year's output averaged 11,823 bbl. daily, and the new wells made possible a higher rate of production toward the end of the year.

Egypt.—The Sudr and Asl fields on the Sinai Peninsula in Egypt produced about 15,000 and 5,000 bbl. daily respectively last year. The potential is higher and production is limited by refinery capacity, Grove said.

Between these two fields is Ras Matarma, producing heavy oil and not developed since the government has issued no lease. During the year two or three wildcats were drilled on old leases but development generally was held up because of the legal difficulties.

Far East.—In India last year, Assam Oil Co., Ltd., produced about 5,500 bbl. daily compared to 5,300 bbl. daily the previous year, according to E. W. Berlin, Standard-Vacuum Oil Co., who gave the review for Southeast Asia and the Far East.

In North Sumatra, Shell and Standard-Vacuum hope in the near future to be able to gain entry to their prewar properties. This has been prevented up to now because of the change of sovereignty in Indonesia and unfriendly natives. He said there is a survey party in the area at the present time.

The companies reentered Central Sumatra following the Dutch police action. The Japanese had drilled 25 to 30 wells in the area but had given up due to the characteristics of the oil. The 50-50 government-Shell field in this area was reentered in January, and the pipe line was rehabilitated by April. In South Sumatra, production from the fields near the two refineries was 91,600 bbl. daily last year against 69,500 bbl. daily in 1948.

In British Borneo, Seria has become the biggest field in the Far East, Berlin said. Its production went from 55,000 bbl. daily in 1948 to 63,000 bbl. daily last year. Tarakan Island off Borneo produced about 7,500 bbl. daily last year, and some exploration work is taking place on the nearby mainland. In Southeast Borneo, Balik Papan has been rehabilitated, and the old fields produced about 15,000 bbl. daily last year.

Berlin mentioned that there is little information available on China since the Communists have taken control. Production in Kansu was about 1,100 bbl. daily last year against about 1,000 bbl. daily in 1948. There was also some further limited development of the gas fields near Chungking. In the Philippines, the Philippine Development Co. is about 2,000 ft. on its third test with some shows of gas and salt water.

G. S. Kaufman, also of Standard-Vacuum, reviewed developments in Japan. He pointed out production was up to about 4,500 bbl. daily in October and said that at the end of the year Imperial Oil Co., 50 per cent government owned and producer of about 95 per cent of the oil in the country, was at about 4,500 ft. in a deep test at the north end of Yabase field.

The well got out of control at one point. It is drilled by electricity, and pipe froze in a power failure. Another deep test in Japan is at the north end of the Hokkaido where it was hoped to test the Cretaceous. There was no new development in Formosa and production continues at 100 to 110 bbl. daily, Kaufman said.

LATIN AMERICA

No Competition

Martorano says Venezuelan oil supplements U. S. output

THE oil produced in Venezuela and imported into the United States does not displace domestic production but rather is complementary to it, Jose Martorano Battisti, head of the Hydrocarbons Bureau of the Venezuelan Ministry of Fomento, said last week in New York.

Martorano, one of the Venezuelan Government's top oil officials, pointed out that much of Venezuela's production is heavy crude yielding fuel oil needed on the eastern seaboard. This, he said, is not in competition with the domestic oil industry.

The ministry official left Caracas early in January and expects to return to Venezuela late this week. He has been in the United States during this time except for several days in London on what he described as a fact-finding trip regarding the British dollar-oil import restrictions.

British problem.—The British policy limiting dollar-oil imports to 4,000,000 tons a year is expected to cause a loss of about 35,000 bbl. daily in Venezuelan production. However, Martorano said this situation is at this time very fluid and the outcome is not known.

Martorano said the oil-policy commission of the government had made recommendations which are now being studied. He did not give an opinion as to when this report will be made public.

Venezuela's over-all reserves increased about 800,000,000 bbl. last year, and the total now stands at 8,400,000,000 bbl. in the proved category, he said. However, exploratory work as shown by the number of parties and wells drilled declined during 1949.

Gas utilization.—Martorano said various projects are now being considered in Venezuela for the utilization of the country's gas production. Venezuela lacks sufficient market for all its gas production, and the oil companies are being encouraged to return gas to the formation, though this operation also has an economic aspect.

One project contemplates the use of dry gas from Guarico in Central Venezuela, the Federal District, and the states of Miranda and Aragua. Electric-power generation would be a major consumer, and the project is being studied by E. Holly Poe, New York gas consultant, and Venezuelan Atlantic Refining Co. Another possibility for the use of gas is at Puerto la Cruz, where two refineries are being built. Such gas would come from oil production in the State of Anzoategui.

Richmond's Export Plans

Richmond Exploration Co. plans to resume shipments of low-gravity crude to the United States from the Lake Maracaibo area of Venezuela this month.

In recent months, Richmond's production has been virtually suspended because of lack of demand for the crude which has a gravity of 9°. The company is a subsidiary of Standard Oil Co. of California.

The crude comes from the Boscan area where Richmond is reported to have large reserves of this type oil. Demand for the production is heaviest in the summer months since its major use is as road oil.

The company completed arrangements to produce the oil early last

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year with the construction of a pipe line to Lake Maracaibo. Production rose to more than 11,000 bbl. daily for the month of July and fell to an average of 240 bbl. daily in December.

Reports from Venezuela are that Richmond is reducing its drilling in Boscan and will operate two rigs in the area. The company has suspended indefinitely its earlier plans for a refinery at the lake.

Ecuador Activity

New construction and new deep test highlight 1949

ANGLO-ECUADORIAN OILFIELDS, LTD., has located the site for a second deep test in its 1945 concession, is now completing a gasoline plant in the Santo Tomas area, and by another expansion project, has brought its total refining capacity up almost equal to the company's crude output.

These and other comments on company activities were made by Lord Forres, the company chairman, in a statement accompanying the recent annual report.

The first deep test on the 1945 concession has gone to about 8,000 ft., the chairman reported, but there have been no signs of commercial production. On the other hand, shallow development in Santo Tomas has been satisfactory.

Anglo-Ecuadorian had some 68 productive wells shut in, due in some cases to high gas-oil ratios but in the majority of cases to the difficulty of obtaining well tubing. Five wells were closed down to equip the better producers.

Process expansion. — The casinghead gasoline plant is expected to be in operation in the near future. The company obtained government permission to raise the price of gasoline and some other products, though the increases were less than hoped for.

The new deep wells in the Santo Tomas area continued to be disappointing. Of five completed, only one gave reasonably good production. The chairman also reported that two additional rigs were on order in Great Britain with delivery expected early in 1950.

Of interest were the comments made on the El Oro concession in southern Ecuador. Lord Forres said a preliminary survey of the concession gave satisfactory indications, and that the results of a detailed geochemical survey confirmed the preliminary report that oil exists in two areas. At present, he said, the company is preparing to drill core holes to obtain geological information prior to making a deep test.

The Anglo-Ecuadorian chairman said that the company had increased its interest in Cia. Petrolera del Ecuador which holds the El Oro concession. To arrange this, it was necessary to purchase additional shares in the Carolina and Petropolis Oil companies. This was considered worthwhile in order to obtain a substantial holding in El Oro.

Venezuelans Promoted

The policy of training Venezuelan nationals for wider employment in the oil industry in that country has been furthered in recent personnel changes at Creole Petroleum Corp.'s Jusepin stabilization and repressuring plant in the State of Monagas.

There the first group of Venezuelans have taken over responsibility for operations. Included among them are foremen for the plant. The expatriate personnel thus replaced have been transferred to Creole's refinery operations.

New Venezuelan Refinery

Phillips Oil Co., wholly owned subsidiary of Phillips Petroleum Co., announced last week it will build a modern refinery and wax plant in Eastern Venezuela.

President K. S. Adams said the plant, to be built in accordance with the company's concession contracts, will manufacture more than 2,000,000 lb. of wax a year.

Actual construction is to begin in 1951, with completion scheduled in 1952. The plant will be the first in Venezuela to produce wax commercially.

Phillips' crude comes from San Roque field, located in a 130,000-acre concession in Anzoategui. Production is about 6,500 bbl. daily from 11 wells. Five rigs currently are running.

El Roble Development

Pantepec Oil Co. has no intention of discontinuing development of El Roble field in Eastern Venezuela.

Pantepec is now negotiating with drilling contractors for drilling after Creole Petroleum Corp. ends its program for Pantepec. In an agreement last spring, Creole undertook to keep five rigs running in El Roble until August 1951 unless the arrangement was sooner terminated by Pantepec. The work by Creole is expected to end as soon as the present three wells being drilled by Creole are completed.

FAR EAST

Japanese Find

Two good reservoirs under Yabase field discovered

THE new Japanese discovery of Imperial Oil Co. has proved the existence of two highly productive reservoirs in Yabase field of Akita Prefecture and is scheduled to continue drilling to about 7,500 ft. in search of still deeper production.

The two reservoirs are below the deep Zone 8 discovered last year. Drilling was to be resumed after repair work in progress was completed.

The well, Koya R-34, early in January was flowing about 2,000 bbl. daily of crude and emulsion according to Leo W. Stach, of the Mining and Geological Division of the Natural Resources Section of the occupation headquarters in Tokyo. Its depth was 6,275 ft.

Because of the high pressure, leaks developed in the well-head equipment, and, to relieve the pressure and prevent a blowout, it was necessary to allow the well to flow while repairs were made. The accidental flow indicates an initial production of about 600 bbl. daily can be expected from wells drilled into the new formations.

Considerable significance has been given the new discovery since the present total production in Japan is only about 4,250 bbl. daily. Drilling of the well was part of the exploration program developed by the Petroleum Resources Development Promotion Council of the Japanese Ministry of International Trade and Industry under the guidance of the natural-resources section's petroleum geologists. This program in the last 3 years has resulted in the discovery of more than 9,000,000 of new reserves, according to the announcement of the general headquarters of the Army's Far East Command.

Pakistan Test Suspended

Burmah Oil Co. (Pakistan Concessions) Ltd., has suspended further drilling in its Lahkra test about 90 miles northeast of Karachi in the Sind desert of Pakistan.

The well, deepest ever drilled in the Indian Subcontinent, encountered large volumes of water under high pressure at 12,666 ft. Cost of the test, which was spudded in May 1948, was understood to be about a million pounds sterling.

The company said that careful consideration is now being given to its future course and that a decision will shortly be made as to other drilling in the general area. Gas shows were encountered at various depths in the well but no commercial oil or gas was found.

Pipe Still for Sale

Standard-Vacuum Oil Co. has placed on the market a vacuum and atmospheric pipe still designed to process 35,000 to 45,000 bbl. daily.

The modern two-stage unit was

intended for Sumatran crude. Standard-Vacuum officials said its purchase was originally arranged in 1944 when it was thought the equipment would be required for the restoration of the company's refinery at Palembang in South Sumatra. Subsequently, the company's representatives found that the existing units could be rehabilitated. The unit is still in the United States.

Exploration in India

Standard-Vacuum Oil Co. is making preliminary exploration surveys in Assam, India, while Burmah Oil Co., Ltd., is preparing another wildcat test in the upper Assam jungle.

Disclosure that Standard-Vacuum is interested in India was made by the Indian minister of works, mines and power in New Delhi. Standard-Vacuum officials in New York said the work thus far consists only of tentative preliminary studies.

India's only production at present is by Burmah Oil in the Digboi area of Assam. Late last year the company completed a test at Tiru Hills, also in Assam, without finding oil.

The new test will be drilled in the fold of rocks above the Naga thrust at Barsilla.

MIDDLE EAST

Trucial Coast Test Spudded

The first exploratory well to be drilled on the Trucial Coast has been spudded in by the Iraq Petroleum Co., Ltd., organization.

The well is near the shore at Ras Sedr in the Shiekhdom of Abu Dhabi on the southern end of the Persian Gulf. The concession is that of Petroleum Development (Trucial Coast) Ltd., which is associated with Iraq Petroleum through Petroleum Concessions, Ltd. Abu Dhabi is one of several small shiekhdoms in the area south and east of the Qatar Peninsula.

Personnel Being Reduced

Kuwait Oil Co., Ltd., has decreased the number of Americans working in the Shiekhdom, and the resulting loss of purchasing power has been a blow to Kuwaiti merchants, according to the Department of Commerce's Foreign Commerce Weekly.

The report was of interest in that it presumably reflected the efforts now under way in the Persian Gulf to reduce the dollar component of the oil produced. Kuwait's production in December was continuing at more than 270,000 bbl. daily.

Not only did the company reduce its American employes but the construction firm building the new $15,000,000 tanker-cargo pier at Mena-al-Ahmedi as well as several other projects, finished its work and transferred some 500 Americans elsewhere. There was an accompanying scarcity of American dollars, it said, and although the healthy boom-town atmosphere still continues, certain readjustments have had to be made. Business in the shiekhdom is looking forward to the possibility of the eventual development of a new field in the Neutral Zone to the south.

EUROPE

Denmark Oil Purchases

Denmark, which uses about 25,000 bbl. daily of petroleum products, has shifted the majority of its liquid-fuel purchases over to nondollar sources in line with a policy announced some time ago.

Denmark is now buying some 60 per cent of her oil requirements in soft-currency areas, compared to about 30 per cent 6 months ago. About three-fourths of the country's needs for the next 5 to 6 months have been met by the import of 90,000 tons of oil, including 20,000 tons of motor fuel, from France. The remaining fourth is to be met by imports from Britain.

According to a report from Copenhagen, efforts to transfer Danish fuel purchases from dollar to nondollar areas will continue, although certain items such as diesel oil are still being bought in the United States. In 1948, Denmark imported 8,504,000 bbl. of which 4,317,000 bbl. came from the Netherlands West Indies, and 1,731,000 bbl. from the United States.

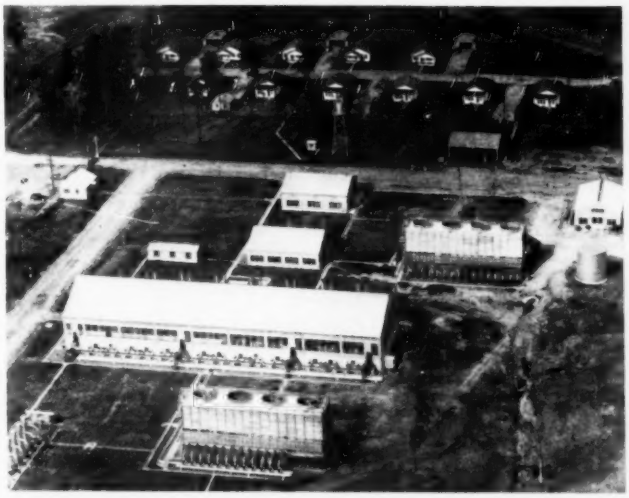
ROCKY MOUNTAIN

Wyoming Properties Sold

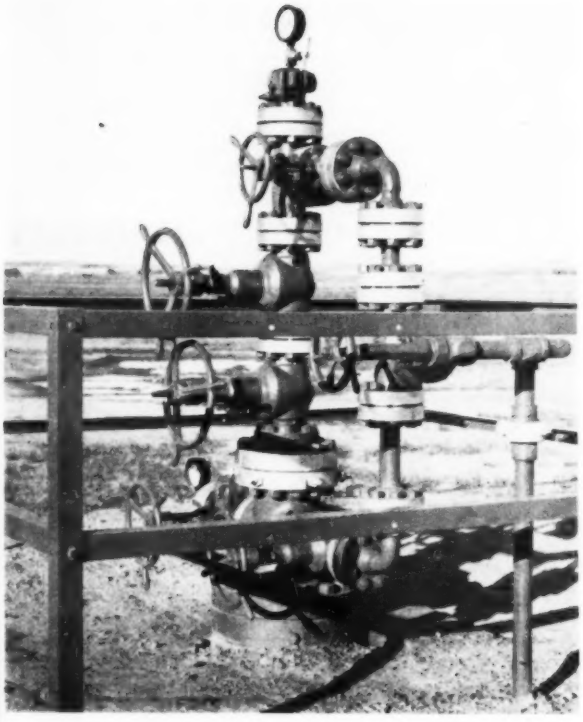
Producing properties in Skull Creek field of Weston County, Wyoming, have been sold by Brinkerhoff Drilling Co., Casper, to Karda Oil Co., Chicago.

Included were 11 Newcastle sand producing wells with daily average production of 250 bbl. Purchase price for the properties was reported in excess of $250,000. Brinkerhoff will retain other producing holdings in the state.

The 1 Mandell, Brinkerhoff well in NW SW SW 3-44n-62w, revived activity in the Skull Creek area in 1948, when it flowed 228 bbl. of oil in 24 hours through a ¼-in. choke from the Newcastle sand.



***GROWING CONCERN.**—This is Station 3 at Fostoria, Tex., of Tennessee Gas Transmission Co., which last year increased its delivery capacity to 710 million cu. ft. daily. The growing 6-year-old company this year has projected an expansion program of a magnitude equal to the construction of its original main line from Corpus Christi to Virginia. The 1950 program includes a 395-mile extension of the main system to near Buffalo, N. Y., and an increase of 1,060 million cubic feet daily in delivery capacity. A request now is pending before the Federal Power Commission for permission to extend the line into New England. During 1949 Tennessee Gas spent $3,500,000 for additional compressor capacity in its 3,048-mile system, adding 17 units aggregating 20,200 hp. at six existing stations. Eight compressor units totaling 10,400 hp. are now being installed in a new station under construction near Agua Dulce, Tex.*



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Production Technology

Viewpoints of management, research, engineering given in A.I.M.E. forum; cut in depletion rate gets attention

Dahl M. Duff

NEW YORK.—Production technologists in the oil industry must learn to accept wider responsibility, not only with management but also among lessees, legislators, and the public at large, R. W. French, Jr., vice president in charge of production of Sohio Petroleum Co., said here last week at the meeting of the Petroleum Branch of the American Institute of Mining and Metallurgical Engineers.

The broader sense of responsibility applies to such matters as proper spacing, unitization, and production rates. French said as an example he once had heard a legislator ask: "How can we promote conservation by changes in taxation?" "Who can answer that question better than the production technologists?" French said.

The Sohio official gave the management viewpoint in a forum on the subject, "The Recent Past and Foreseeable Future of Production Technology." The research viewpoint was discussed by Dr. Morris Muskat, head of the physics division, Gulf Research & Development Co., and that of engineering, by Charles V. Millikan, chief engineer, Amerada Petroleum Corp.

Management.—In enumerating what he said was "one man's idea" of the accomplishments and shortcomings of production technology, French said that often its reports are indefinite and vague, lack clear-cut recommendations, and fail to bring out the economic angle. As an example, he cited such general statements as "this should operate to reduce the dollar lifting costs."

On the other hand, French said management is constantly being furnished new equipment and techniques for doing more work with less money. Without basic technological information, it is impossible to determine the cost vs. the return per barrel of oil. Furthermore, he said, management has the duty of insuring the environment in which technical progress can continue.

Some of French's remarks stirred a mild controversy. Speaking from the floor, T. A. Pollard, supervisor of production research, Socony-Vacuum Laboratories, field research department, pointed out that work was hampered after the war by a general shortage of technical men, and in addition said that management in some cases had failed to supply money to hire enough such men.

Research, he continued, is much like wildcatting. The entire cost of the program must be recovered on a relatively small number of successful projects, and management should realize this fact.

Engineering.—Millikan reviewed the history of technical progress in the oil industry and said that valuable as physics and mathematics are, it is necessary to "go out and get acquainted with the oil well." Each well, he added, has an individual character, sometimes that cannot be measured with a micrometer or a slide rule.

Millikan pointed out several concepts that characterize modern technology. One was the concept of the reservoir as a whole. This came with the development of East Texas field, and along with it was the idea of water drive. In the twenties, it was the well and not the reservoir that was the center of attention.

Research.—Muskat discussed the accomplishments of the research branch of the production field. He pointed to the trend of deeper drilling and offshore operations in progressively deeper water.

The trend of higher costs in these operations must be arrested, or the industry will face increasing competition from synthetic fuels. Another major problem is to raise the amount of recoverable oil, now a maximum of 70 to 80 per cent. Research should increase the amount of oil that can be recovered short of mining, he said.

Taxes.—The principle of the depletion allowance was defended in another talk by H. A. Stewart, director of the Oil and Gas Division, Department of the Interior, who spoke on "Incentives in the Petroleum Industry" before the A.I.M.E.'s Mineral Economics Division.

Stewart rejected as unsound the idea of government subsidies, such as payment for each discovery well drilled or so many barrels of new reserves added. The federal Government can supply the most important incentives to the petroleum industry in the field of taxation.

"I am not here to argue for or against any specific percentage as a proper one for a depletion allowance, but I can say this from personal experience: that the depletion allowance which has been enjoyed by the oil industry has been one of the major factors in the aggressive development program which has been under way in the Rocky Mountain Region since the close of the war," he said.

"There are, of course, other factors entering into this program, but the depletion allowance has been the major attraction for the large number of small operators who have drilled exploratory wells in the area during the past 4 years. I am confident that the problem will be carefully studied in Congress, and I am hopeful that no action will be taken

Speakers for the seminar on production technology at last week's meeting of the Petroleum Branch of the A.I.M.E. in New York: R. W. French, Jr., vice president, Sohio Petroleum Co., Cleveland; Charles V. Millikan, chief engineer, Amerada Petroleum Corp., Tulsa; and Dr. Morris Muskat, head of the physics division, Gulf Research & Development Co., Pittsburgh. French is a new vice chairman of the Petroleum Branch, Millikan is an A.I.M.E. director, and Muskat is chairman of the production technology committee of the Petroleum Branch.

that will seriously jeopardize our exploratory program."

The second field in which the federal tax program can be an incentive is that affecting small business, Stewart said. Under the present tax structure, he continued, only the few extremely fortunate concerns are in any position to grow, and Stewart said he thought it probable that a wise tax structure can be devised that will encourage the small operators and assist them in maintaining the financial help that will see the companies through most of the vicissitudes of the small producers' existence.

Lube Tax Repeal Sought

WASHINGTON.—Repeal of the excise tax on lubricating oils and lubricants is being sought by American Petroleum Institute, National Petroleum Association, Pennsylvania Grade Crude Oil Association, and Western Petroleum Refiners Association.

Donald C. O'Hara, attorney for the organizations, appeared before the House ways and means committee last week to call attention to the fact that while there is widespread public demand for elimination of wartime excise taxes on luxury items, "one of the most burdensome excise taxes is borne by users of lubricating oil."

"The tax upon lubricating oils and lubricants was first imposed as an emergency relief measure beginning June 21, 1932, at the rate of 4 cents per gallon. In order to help finance expenditures for national defense and later the war effort," O'Hara said, "the tax was increased to 4½ cents, and 2 years after that to 6 cents per gallon, which represents a 50 per cent increase from its original level."

O'Hara told the committee, in response to a question from Rep. Daniel Reed (R., N. Y.) that one of the most serious situations facing the marketers of lubricating oil today was the growing competition from sale of reclaimed oils. These oils were originally considered to be subject to the tax, he said, and for a time tax was collected. However, a court decision later ruled that since operators processing reclaimed oil were not "manufacturers," the tax did not cover these operations.

Houston A.I.Ch.E. Meeting

HOUSTON. — Recent developments in chlorine and alkali manufacture, waste disposal and pollution control, ultrasonics, and separation of complex mixtures will be featured in discussions at the regional meeting of the American Institute of Chemical Engineers here.

The meeting will be held February 26-March 1. Headquarters will be in the Rice Hotel.

In addition to the technical meetings and symposia, plant trips have been scheduled to the Houston works of Diamond Alkali Co., Deer Park refinery of Shell Oil Co., and the plants of Sheffield Steel Corp., Consolidated Chemical Industries, and Lone Star Cement Corp.

MID-CONTINENT

Unitization Study

OKLAHOMA CITY. — A group of Oklahoma legislators and oil experts took a 2-day tour of Arkansas and Louisiana oil fields last week, to get a first-hand look at conservation practices, and study unitization methods used in those states.

Headed by Sen. Frank Mahan, the group visited the Shuler and Smackover fields of Arkansas, and fields near Shreveport. Made up of 25 individuals, the group studied Louisiana's pooling arrangement, recycling facilities, and recently inaugurated secondary-recovery and pressure-maintenance programs.

Union Seeks Wage Hike

EL DORADO, Ark.—A 15 cents per hour across-the-board wage increase and other concessions will be asked by the Oil Workers Union (C.I.O.) from Lion Oil Co.'s chemical division here this year. Present contract expires in mid-March.

The 550 workers represented by the union receive from $1.16 to $1.92 per hour, E. P. Shelton, chairman of the union's local bargaining committee, said. He said the union would seek an improved sick-benefit pay plan, group insurance, and a profit-sharing program in addition to some 30 changes in rules. The latter include requests for seven paid holidays instead of six, amendments to procedure on grievances, vacation seniority, leaves of absence, and overtime.

The demands were submitted to Lion last August, Shelton said, and several preliminary discussions already have been held.

The union is also engaged in negotiations with Pan Am Southern Corp., El Dorado. Some 200 union workers are employed at that firm.

WEST COAST

Downtown Drilling Sought

LOS ANGELES.—Pictures of park-like drilling sites and hidden producing wells were painted before members of the Los Angeles City Council last week.

Continental Consolidated Corp. was making its second bid for a drilling permit to enable it to begin drilling operations in a 450-acre tract in Los Angeles where drilling heretofore has been prohibited.

Howard Pyle, Continental Consolidated president, told the council each site would be landscaped to resemble a small park; adequate fences and walls would be built and each site would be landscaped to screen the drilling operation; and "quiet" equipment would be used.

Derricks would be removed immediately after completion, Pyle told the council, and any later work would be done with portable units. All production equipment, he said, would be installed below ground level.

Pyle told the council that up to 20,000,000 bbl. of oil might be recovered from the area, located directly east of the Los Angeles River flood-control channel.

The council accepted an invitation of the company to make a tour of sites where "quiet" equipment now is being used in residential areas. The council later will decide whether to place on the June 6 ballot a provision for drilling in the downtown area.

NEXT WEEK

FM Radio in Refinery.—George Weber, the Journal's refining editor, tells how Esso Standard Oil Co. uses this modern communication method to link 33 refinery vehicles with central dispatch office.

Refining Analyses of Crudes.—U. S. Bureau of Mines tabulates data for Middle East, South American, and Canadian crudes (properties, yields, etc.).

Oil From Reefs.—This is a hot subject nowadays; H. A. Lowenstam of Illinois Geological Survey reports on "Niagaran Reefs in Illinois and Their Relation to Oil Accumulation."

Micrologging.—H. G. Doll, Schlumberger Well Surveying Corp., explains this new electrical logging method, for the detailed determination of permeable zones.

New Drilling Methods and Equipment.—Earl C. Hellums, vice president, Cron & Gracey Drilling Corp., Houston, presents review of subjects given at recent A.P.I. Houston meeting.

New Production Methods and Equipment.—Companion paper also from A.P.I. Houston meeting.

Modern Fire Control.—George F. Prussing, consulting engineer, Los Angeles, discusses this subject.

Planning Gas Compressor Stations.—No. 3 installment of current series.

PERSONALS

Geologist

George Clement has been with Texaco since 1933

GEORGE M. CLEMENT, who was recently appointed to the top geological post of The Texas Co., Houston, is beginning his seventeenth year with the company.

A native of Horatio, Ark., Clement graduated from the University of South Dakota with a B.A. degree in 1928. After working 2 years for Shell Oil Co. as an assistant geologist, he was employed as a graduate and research assistant at the University of Iowa. He served in this capacity from 1931 until 1933, while completing study for his Ph.D. degree in geology.

Starting with Texaco at Shreveport in 1933, Clement remained there until 1941, when he was transferred to New Orleans as geologist.

In September 1943 Clement was transferred to the producing department manager's office at Houston, as geologist. He was named senior geologist in 1945, and assistant departmental geologist last March 1. In his new position he is serving as departmental geologist.

Ruben C. Mills, Jr., formerly district geologist for Standard Oil Co. of Texas at Midland, is now serving as acting division exploration superintendent at Abilene, as head of the central division office.

S. F. Bowlby, vice president, Shell Oil Co., has been elected president of the Petroleum Production Pioneers. Other officers who will serve during 1950 include: **Glen Merkley,** National Supply Co., vice president; **L. L. Aubert,** president, Bankline Oil Co., treasurer; **Dick Sneddon,** reelected secretary; **Joe Robinson,** president, Santa Fe Drilling Co., sergeant-at-arms; and **Ted Sutter,** vice president, Baker Oil Tools, Inc., historian. **R. E. Stearns,** vice president, Universal Consolidated Oil Co., was elected honorary president, and **Max App,** vice president of General Petroleum Corp., was named honorary vice president.

Bruce J. Miller, reservoir engineer at Fort Worth for The Texas Co., has been named district engineer, headquartered at Wichita Falls, Tex.

P. E. Narvarte, San Antonio consulting geophysicist, has been named temporary chairman of the newly organized San Antonio chapter, Society of Exploration Geophysicists. **John F. Imle,** Petty Geophysical Engineering Co., was named temporary secretary.

John H. Murrell, general partner in the firm of DeGolyer & MacNaughton, will deliver a series of lectures at the University of Texas, Austin, on the appraisal of petroleum properties, and appraisal of stocks and bonds of companies owning petroleum properties.

Thomas H. Allan has been elected president of the Wichita Petroleum Club. Other officers include: **V. J. Mercier** and **N. D. Clark,** vice presidents; **R. S. Webb,** secretary; and **Ben F. Horton,** treasurer.

John G. Munson, field project engineer during construction of Stanolind Oil & Gas Co.'s Brownsville, Tex., chemical plant, has been named assistant superintendent of the plant. Others assigned to the plant include: **George Ayton,** formerly technical group leader in the synthesis pilot plant, Tulsa, appointed supervisor of the chemical-operations section; **Joe Weaver, Jr.,** senior chemical engineer, Tulsa, named chemical-process supervisor; **Lloyd Christensen,** appointed supervisor of chemical-plant laboratory operations; and **Raymond S. Tolson, Jr.,** named safety and plant protection supervisor. **L. L. Smith** is plant superintendent.

Peck Hardee, Jr., district engineer for Texas Pacific Coal & Oil Co. at Odessa, Tex., has been transferred to Midland, Tex., as division engineer.

C. E. S. Bellows, III, geologist for The Texas Co. at Mount Pleasant, Mich., has been transferred to Midland, Tex., in the same capacity.

D. H. Trahan, exploitation engineer for Shell Oil Co. at Midland, Tex., is now serving in that capacity in the Odessa, Tex., area.

Lloyd F. Thanhouser, Houston, has been elected a vice president of Continental Oil Co., and will also retain his present position as general counsel. **R. L. Bosworth,** Ponca City, Okla., has been appointed treasurer in addition to serving as financial vice

L. F. THANHOUSER

A. W. TARKINGTON

president, and **A. W. Tarkington,** former treasurer, Ponca City, has been appointed assistant to **L. F. McCollum,** president. Thanhouser joined Continental Oil Co. last year, and is a graduate of Yale University. Bosworth has been with the company nearly 27 years, and Tarkington joined the firm as treasurer in 1948.

W. F. Armogast, superintendent of Cat Creek field, Wyoming, operations for Continental Oil Co., has been transferred to Glenrock, Wyo. Succeeding him at Cat Creek is **Arthur Winnett,** who has been in that area since 1932.

K. H. SHAFFER

K. H. Shaffer has been appointed assistant general manager of Standard Oil Co. of California's producing department, and will direct oil-field development work. He joined the company in 1929 and has worked in South America and California on engineering and organization problems. For the past 2 years he has been manager of producing in the company's northern district, headquartered at Taft, Calif. **C. W. Gibbs** has been named to succeed Shaffer as manager of the northern district, and **F. A. Heitmeyer** has been named general production superintendent for that area.

C. Richard Coslow has been named assistant general manager of Socony-Vacuum Oil Co., Inc.'s operations in Austria.

Dr. J. Schander, noted geophysicist, has returned to Houston from his home in Hanover, Germany, and will be associated with the Cockburn Oil

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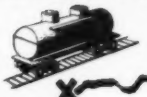

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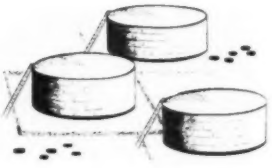

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Corp. as chief geophysicist and geologist. Schander, former manager of the North American Exploration Co., operated contract crews, manned by German scientists, in Texas and Louisiana for Cockburn and other companies from 1924 to 1932.

Dr. William E. Wrather, director, U. S. Geological Survey, has been awarded the Anthony F. Lucas petroleum medal for 1950 by the American Institute of Mining and Metallurgical Engineers. The medal recognizes distinguished achievement in improving the technique and practice of finding and producing petroleum, and was granted to Dr. Wrather following recommendation of a 16-man committee.

C. C. Pitts, drilling engineer for Kerr-McGee Oil Industries, Inc., at Oklahoma City, has been transferred as drilling engineer for the West Texas district, with headquarters at Midland, Tex.

J. C. CRAIG

James C. Craig, superintendent of Continental Oil Co.'s offshore drilling operations, and **John H. Davis,** district geologist, Gulf Coast marine district, have been assigned to represent Continental in the company's joint operations with Magnolia Petroleum Co. off the coast of Louisiana. Craig was appointed to his present position in 1948, and formerly headquartered in New Orleans. Davis joined the company as a geologist at Lafayette, La. Headquarters for the two men will be at Morgan City, La.

R. V. Mertz, formerly engineer at Stanolind Oil & Gas Co.'s Levelland, Tex., gasoline plant, has joined Tennessee Gas Transmission Co., Houston, as chief process engineer.

C. L. Sparkman, tool pusher at Grand Isle, La., for Humble Oil & Refining Co., has been transferred to the Eucutta district, Waynesboro, Miss.

Eddie J. Hudson, engineer for Atlantic Refining Co. at Odessa, Tex., is now located at Dallas where he is specializing in proration and unitization problems.

C. I. Weaver, president and general manager of Ohio Fuel Gas Co., Columbus, has been elevated to chairman of the board of directors, a position which has been vacant, and will continue as the company's chief executive officer until March 1951, when he reaches retirement age. **Earl C. Overbeck** has been elected president, replacing Weaver; **William N. Grinstead** has been elected vice president and general manager; **James A. Scanlon** has been elected treasurer; and **Wilbur T. Shinholser** has been elected vice president and chief engineer. Weaver has been with the company since 1930, and Overbeck has had 37 years' experience with the firm. Grinstead joined Columbia Gas System in 1929 and transferred to Ohio Fuel in 1939. Scanlon joined the system in 1922, and 3 years later joined Ohio Fuel, and Shinholser came with the company in 1929.

E. C. OVERBECK

C. I. WEAVER

W. N. GRINSTEAD

W. T. SHINHOLSER

Joseph H. Salmon, until recently assistant to the president and economic adviser of Shell Oil Co., has opened offices as management consultant in New York and will specialize in the oil, gas, chemical, and allied industries. During his 27 years with Shell, Salmon successively served as assistant to the chief engineer, assistant to the manufacturing vice president, manager of transportation and supplies department, chairman of the long-range planning committee, chairman of the economics committee, and as assistant to the president and economic adviser. While with Shell, Salmon was also associated with developments in the chemical, light-hydrocarbon and natural-gas fields. During the war he was chief of the petroleum price section of the Office of Price Administration. He was graduated from Penn State in management engineering and from the St. Louis University Law School, and took work in economics and chemistry at Washington University.

J. H. SALMON

T. G. Stevenin, chemical engineer formerly with the U. S. Government's Northern Regional Research Labora-

NEW YORK CITY NOMADS OFFICERS.—Above are the newly elected officers of the New York City Chapter of Nomads. Front row, left to right: Ed T. Landgraff, Chicksan Export Co., secretary; Maurice F. Delano, R. S. Stokvis & Sons, Inc., treasurer; Henry J. McAdams, Jones & Laughlin Supply Corp., president; and Howard B. Book, Reed Roller Bit Co., vice president. Back row, left to right: Fred J. Jobst, affiliated with Val R. Wittich, Jr., assistant secretary; Eugene R. Smoley, Lummus Co., assistant sergeant-at-arms; John D. Evans, Lucey Export Corp., assistant treasurer; and Kenneth D. Demarest, Fluor Corp., Ltd., sergeant-at-arms.

PERSONALS

tory, Peoria, Ill., has been named plant technologist at Deep Rock Oil Corp.'s Cushing, Okla., refinery, and **J. W. Beam,** formerly instrument engineer with Universal Oil Products Co., has been appointed supervisor of the instrument department.

C. A. HAMMAN

Cecil A. Hamman has resigned as division engineer for Pure Oil Co. at Olney, Ill., and has joined **S. C. Yingling,** independent operator, at Evansville, Ind. A graduate of Purdue and Tulsa universities, he formerly was with Ohio Oil Co. as a petroleum engineer, serving for 9 years in Oklahoma and Texas. He joined Pure Oil in Texas, and 2 years later was transferred to Olney.

Dr. Byron B. Boatright, formerly vice president and general superintendent of Conroe Drilling Co., recently opened offices in the Capital National Bank Building in Austin, Tex., where he will practice as a consulting petroleum and natural-gas engineer.

H. F. Kincaid, production superintendent at Sidney, Neb., for Ohio Oil Co., has been transferred to Cody, Wyo., as field superintendent.

Dr. José Martorano Battisti, director of the Technical Office of Hydrocarbons, Ministry of Development of Venezuela, spent the latter part of February on a business trip to the United States, which took him to New York, Washington, D. C., Tulsa, and Dallas. Before visiting the United States, Martorano had traveled to Paris and London representing his Government on a special mission.

F. A. C. Guepin, formerly senior vice president of Shell Union Oil Corp., New York, has been appointed a director and managing director of the Anglo-Saxon Petroleum Co., Ltd., and Shell Petroleum Co., Ltd., and a member and a delegate member of the board of de Bataafsche Petroleum Mij. He joined the Shell organization in 1929 and after service in various European posts, came to the United States in 1937 as executive vice president of Shell Oil Co. on the West Coast. He returned to London in 1944 and last year was given supervision of Europe and North Africa for the company.

F. C. WHITESIDE

Foster C. Whiteside, Tulsa, assistant chief engineer of Interstate Oil Pipe Line Co., has resigned and accepted the position of chief engineer of Continental Oil Co.'s pipeline department. Whiteside began his pipe-line engineering career with Oklahoma Pipe Line Co., and in 1938 transferred to Carter Oil Co. He went to Venezuela in 1941 as safety engineer for Standard Oil Co. of Venezuela. He moved to Atlanta on an assignment with Plantation Pipe Line Co. in 1943, and in 1945 was transferred to the engineering department of Interstate in Tulsa.

Robert R. Moore, Indianapolis, has been named executive secretary of the Indiana Independent Petroleum Association, succeeding **George W. Hofmayer,** who has accepted a similar position with the Texas Oil Jobbers Association.

DEATHS

C. H. Doty, formerly district foreman in West Texas for Shell Pipe Line Co., died in McCamey, Tex., February 1.

Floyd Stewart, coowner of the Treater State Oil Co., and an employe, **Joe Simms,** both of Goldsmith, Tex., were accidentally electrocuted February 15 at Goldsmith.

Harry Short, 58, production superintendent for Ralph Chamberlain for a number of years, died in Lewistown, Mont., recently.

James C. McLaughlin, 81, retired employe of Quaker State Refinery Co., died in Franklin, Pa., February 8. He had been with Emlenton Oil Refinery Co., later Quaker State, for 43 years until retirement in 1938.

Sota J. Campbell, 60, president of Gas Service Corp., McAlester, Okla., and Civic Gas Co., Atoka, Okla., died in McAlester February 11.

J. W. Painter, oil-transportation expert and southwest regional director of the Office of Defense Transportation in World War II, died February 10 in Houston. During his career, Painter worked for The Texas Co. and the Lillie W. Simms Oil Interests.

Robert B. Campbell, Dallas independent oil operator, died February 13. Since 1919 he was a partner in the firm of McDonald & Campbell.

Clay Briggs, 64, Bartlesville, Okla., chief engineer for Cities Service Oil Co. since 1920, died February 18. He had been with the firm since 1917 and formerly was with Shell Oil Co. He also served as vice president of Cities Service Transportation Chemical Co., Ponca City, Okla., and was a director of Empire Pipeline Co., Texas Empire Pipeline Co., and Texas-New Mexico Empire Pipeline Co.

Willis E. Buchanan, 72, retired purchasing agent for Standard Oil Co. (N. Y.), died February 16 at New Smyrna Beach, Fla.

George Rushton, 46, chief clerk for Schlumberger Well Surveying Co., died in Long Beach, Calif., February 6.

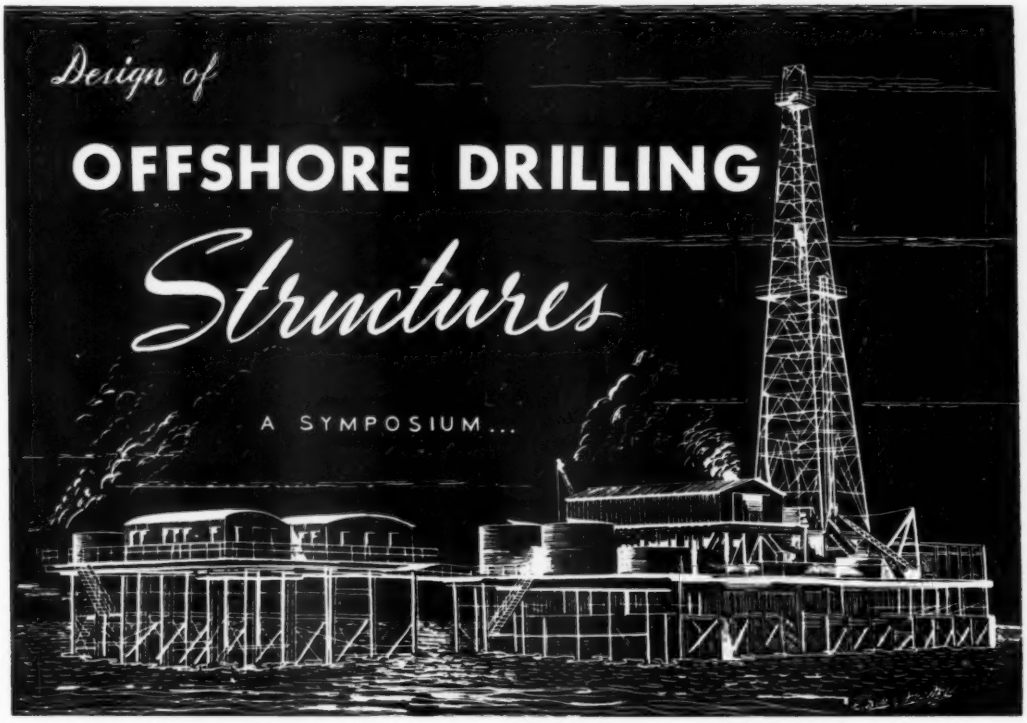
Henry Dundas, 72, who retired in 1942 as director and vice president of Standard-Vacuum Oil Co., died February 12 in Miami Beach, Fla. He joined the India Staff of Standard Oil Co. in 1900 and participated in the development of the company's marketing organization in India. He came to the United States in 1914 and later was elected a vice president of Standard Oil Co. of New York. He became a director and one of the first vice presidents of Standard-Vacuum when that company was formed in 1933.

J. Cade White, 60, Winnie, Tex., oil operator, died February 13.

A. C. Galbraith, Los Angeles, former vice president of Union Oil Co., died February 5.

Calvin C. Green, 73, retired oil man, died in Los Angeles, February 5.

Charles T. Hannan, 57, who retired last September as assistant superintendent of the marine division of Esso Standard Oil Co.'s Bayway, N. J., refinery, died February 15 in Madison, N. J.



MUCH discussion has been generated by the October 3 hurricane which damaged two drilling platforms lying off the Texas coast. Designers of offshore structures immediately began to reexamine their basic design data in light of the storm. Insurance men reexamined their rates and checked to see if preventable losses had occurred. Meteorologists and oceanographers checked conditions in the immediate area to see if the basic assumptions used in the design of the platforms were correct. As a contribution to the industry, Ohio Oil Co. and Stanolind Oil & Gas Co. prepared detailed reports on the damage to their respective platforms. The two companies made this information readily available to all operators with an interest in offshore operations. Because of the progressive attitude of Ohio and Stanolind much of benefit has been learned by the industry as a whole. In this special symposium, the Journal is printing, in detail, the two storm-damage reports . . . PLUS . . . discussions by experts in the fields of design, engineering, oceanography, meteorology, and insurance as it relates to drilling in the Gulf of Mexico.

The Operators' Committee

SINCE its organization in the latter part of 1948, the Offshore Operators' Committee, an informal group consisting of representatives of operators owning leases in the Gulf of Mexico, has contributed considerable time and effort toward the solution of problems common to all operators in the Continental Shelf.

Pictured here are the initial officers and the present officers of the group. Mercer H. Parks, Humble Oil & Refining Co., was original chairman and W. F. Herbert, The Texas Co., secretary. Present chairman is I. W. Alcorn, Pure Oil Co., and Sam C. Oliphant, Stanolind Oil & Gas Co., is secretary.

Causes and cures of the damage caused by the October 3 hurricane have been discussed thoroughly at a recent meeting of the group. The papers in this symposium are a result of that meeting.

The Offshore Operators' Committee meets regularly to discuss problems rising in conjunction with the governmental agencies charged with administering certain regulations which had been formulated over a period of many years of general operation of ships in open waters.

Its chief function is to consult with these agencies attempting to bring about an understanding among petroleum operators and mutual cooperation on special problems resulting from the search for oil which could not be foreseen in the formulation of present regulations.

Secondary purpose of the committee is to investigate the feasibility of projects for forecasting wave heights, directions, and related phenomena as aids to offshore petroleum operations, and the investigation of the advisability of sponsoring oceanographic research projects to determine the physical and biological conditions in the Gulf.

Front: Mercer H. Parks and I. W. Alcorn. Rear: William F. Herbert and Sam C. Oliphant.

GULF HURRICANE

. . . and consequent damage to Ohio Oil Co.'s offshore drilling platform in Texas Gulf waters

by R. C. Farley and J. S. Leonard

THE drilling platform and adjacent quarters platform with which this report deals is that used by Ohio Oil Co. in drilling a test well in the Gulf of Mexico, and is herein referred to as structure or platform No. 2. It is located at N. Lat. 28° 38′ 21″, W. Long. 95° 40′ 21″, on State Lease 31794, Gulf of Mexico, Tract 403, being also approximately 6 miles off the Matagorda County, Texas, coast near Brown Cedar Cut and 27 miles southwest along the shore from Freeport, Tex.

1. The Hurricane

At 6:30 p.m., Saturday, October 1, 1949, the Freeport office of Ohio Oil Co. was advised by telephone that a tropical storm was forming in the gulf off Merida, Mexico. This communication was relayed from the New Orleans Weather Bureau. An immediate check with local weather sources failed to provide any further information. However, New Orleans Weather Bureau advisories Nos. 2 and 3 were obtained during the night from the local Coast Guard station.

The New Orleans weather advisory No. 6, issued at 10 a.m., October 2, showed a change in direction and an increase in forward speed of the

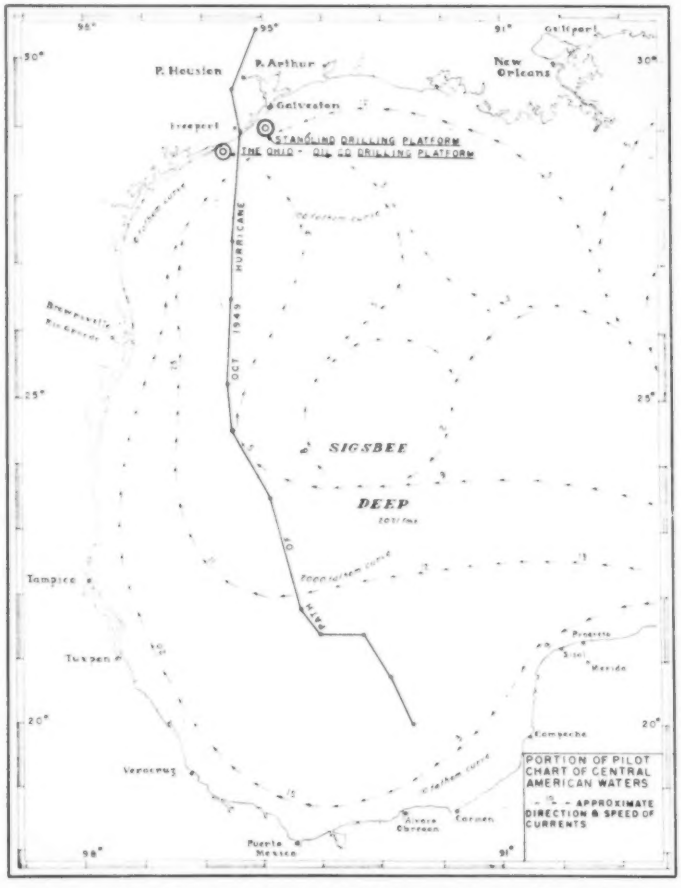


Fig. 1—Path of Gulf of Mexico hurricane, straight into the Ohio Oil and Stanolind offshore drilling platforms.

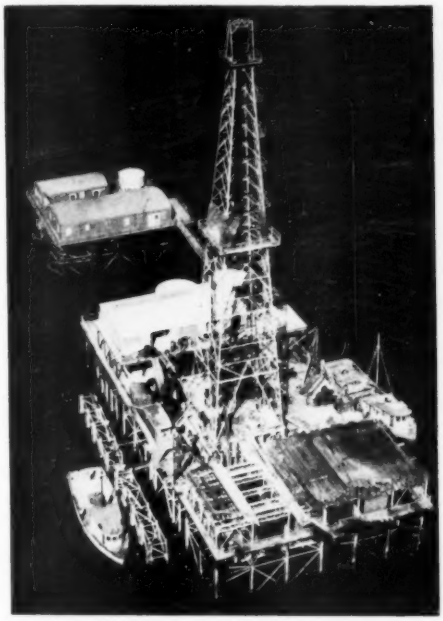
The Authors

R. C. FARLEY

J. S. LEONARD

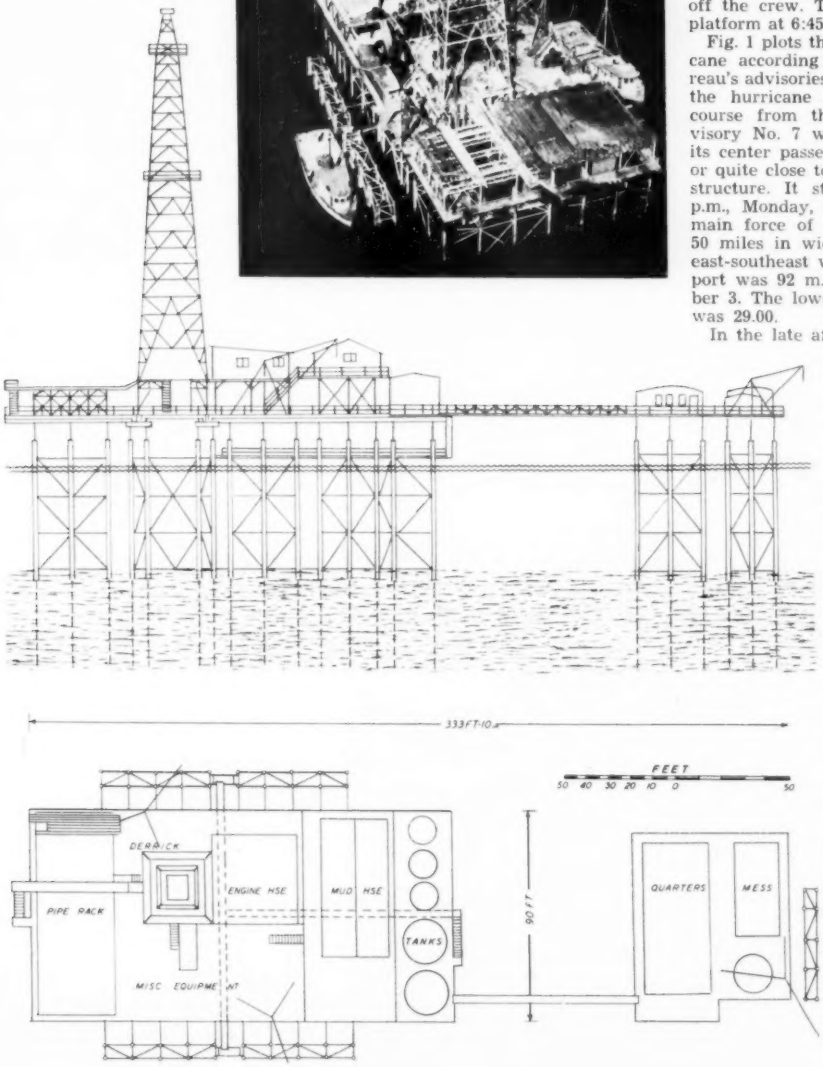
Ralph C. Farley is assistant to general superintendent of production, Ohio Oil Co., Findlay, Ohio. Farley began his career with Ohio Oil in the pipe-line department at Del Rio, Tex., in 1926. He was transferred to East Texas in 1931, and a year later was put in charge of construction in the East Texas field. Farley was appointed district foreman in the Rodessa, Texas, field in 1939. He became district foreman at Carlisle, Tex., in 1941, and was appointed division superintendent of production at Shreveport in 1944. He was placed in charge of the company's offshore operations in March 1948 and in February 1949 he was appointed to his present position.

John S. Leonard is superintendent of operations in the Gulf of Mexico for Ohio Oil Co., at Freeport, Tex. He joined Ohio Oil in 1930 after studying at Colorado School of Mines. For 10 years he was assigned to the company's operations in Mexico as a geologist and in the production department. Leonard was named district petroleum engineer at Hobbs, N. M., in 1940 and at Bay City, Tex., in 1941. He became superintendent of Ross Ranch, Texas, field in 1945 and drilling foreman there in 1947; in 1948 he was made drilling foreman at Reed City, Mich. Leonard was appointed to his present position in February 1949.



BEFORE.—This aerial shot depicts the Ohio Oil Co. platform 6 miles off Matagorda County, Texas, before the disastrous hurricane of October 3 struck. Crew quarters and mess-hall building are located on the separate platform in the background.

Fig. 2—(Below) Elevation and plan layouts of offshore drilling structure, Ohio Oil Co.



storm. The advisory also stated that hurricane warnings were to be hoisted from Corpus Christi to Galveston. Drilling crews were instructed immediately to pull the drill pipe up in the 13⅜-in. casing, set at 3,001 ft.; lay down the drill pipe standing in the derrick, and otherwise secure all material and equipment against possible hurricane damage, in preparation for evacuation of the platform. Total depth at that time was 6,458 ft. The crews finished laying down drill pipe and securing all materials and equipment about 2 a.m., Monday morning, October 3.

The crew boat was standing by location about 5 a.m., Monday, to take off the crew. The last man left the platform at 6:45 a.m.

Fig. 1 plots the course of the hurricane according to the Weather Bureau's advisories. It will be noted that the hurricane pursued a northerly course from the time weather advisory No. 7 was received and that its center passed either directly over or quite close to Ohio's No. 2 drilling structure. It struck Freeport at 11 p.m., Monday, October 3, 1949. The main force of the storm was about 50 miles in width. Highest recorded east-southeast wind velocity at Freeport was 92 m.p.h. at 11 p.m., October 3. The lowest barometer reading was 29.00.

In the late afternoon of October 4, the weather cleared sufficiently for a plane trip to be made from Houston to Freeport and out over the drilling structure. Observation from the air indicated little damage in Freeport or at the Freeport terminal. Extensive damage was visible at the drilling platform, especially to the quarters house structure, dolphins, fresh-water tanks, and the stiff-leg crane. It could be seen that the two houses and some other items had been washed away.

The full extent of the damage was not known until Wednesday, October 5, when a crew boat with Ohio representatives, together with a photographer, and others visited the platform. A picture story was recorded during this visit. Upon boarding the platform, it became evident that a

complete and accurate inventory would be impossible until sufficient men and equipment could be brought to the platform to sort the tangled decking and material. However, a preliminary damage report was made at this time. All personnel returned to Freeport that evening.

On October 6, another boarding party, including Ohio personnel from both the Houston and Freeport offices, as well as representatives of J. Ray McDermott, Brown & Root Construction Co., insurance adjusters for both Kerr-McGee and Ohio, and a photographer engaged by Ohio and the insurers, left Freeport for the platform. After examining the damage a second time, it was agreed to dispatch two drilling crews and several Ohio employes the following day to drain and flush all motors which might contain salt water and to repair or cover any material or equipment that might suffer further damage from the elements. These procedures were carried out with the working personnel setting up improvised sleeping quarters in the mud house while their meals were served from one of the crew boats.

An agreement was negotiated with a marine contracting company from New Orleans to start the repair and salvage operations as soon as its marine equipment could arrive at Freeport.

By reference to estimates based upon the preliminary damage report, land personnel at Freeport was constructing the necessary piling, fabricating the replacement I-beams, preparing the steel crew houses from our structure No. 1 and placing orders for materials to replace that lost overboard. When the contracting company's equipment arrived at Freeport on October 13 from Louisiana, loading operations preparatory to moving the abovementioned materials to the platform were begun immediately.

2. The Damage

It was apparent from the position and disarrangement of debris on the platform that the main destructive force of the wind and waves came from an easterly to northeast direction. The axis of the platform and quarter island was oriented approximately N. 50° E., the quarter island being northeast of the drilling platform.

The quarter island substructure comprised of separate jackets—No. 1 and No. 2—above which the galley and bunk house were respectively located, gave evidence of the manner in which these buildings were washed into the sea. All of the 8-in. cap beams under the galley house were broken off where they were welded to the piling and were missing, together with the galley. This unit weighed approximately 30 tons. The center pile of three pilings on the northwest end of this No. 1 jacket was bent 90° outwardly, approximately 10 ft. below the water line, indicating that the galley house, after breaking loose from the piling, fell down through the jacket to a point not over 10 ft. below the water line and then was washed out of the jacket into the open sea through the opening where the abovementioned piling was bent outwardly. Both of the above buildings were bolted down with ¾-in. bolts to the 8 and 10-in. cap beams which were in turn welded to the 10¾-in. piling.

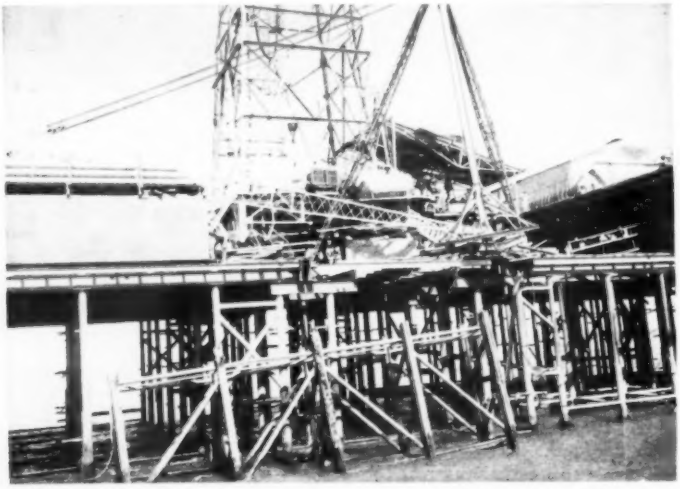
The 8-in. cap beams under the bunk house were not lost with the bunk house; however, the manner in which they were distorted indicated that the 80-ton bunk house was turned approximately 60° off its axis before it tilted and plunged southwesterly from jacket No. 2 into the sea. The second piling from the northwest end of jacket No. 2 on the side adjacent to the main drilling platform was bent in a northwesterly direction and the protruding ends of two of the cap beams were bent downwardly—indicating that the house slid off of the cap beams in the above-described manner.

The 24-in. cap beam on deck section No. 11 at the most easterly corner of the main drilling platform appeared to have been bent upwardly and sheared off. The 11-in. corner piling at this corner was also bent inwardly and flattened. It is believed that the bunk house was washed against the corner of the platform causing the above damage immediately after sliding into the sea.

The dolphin on the northeast end of the quarter island was pulled out of position and against jacket No. 1 by reason of the bunk house falling on the 1-in. cables which secured the dolphin to the nearest piling of the main drilling platform. It was necessary to replace jacket No. 1 because of damage to bracing some 15 ft. under the water line—caused, it is believed, by the galley house falling into this bracing. The only equipment remaining on the quarters island was the 4-ton stiff-leg derrick and hoist.

All 3-in. decking around this stiff-leg was torn loose and disarranged but quite a number of loose pieces of this decking were still lying loose on the steel framework of this deck section. Surprisingly enough the hoist and diesel engine with 16-volt storage battery was readily started and the boom of the stiff-leg operated with no apparent effects after the storm. Batteries on motors on the main platform were dead following the storm.

Of the four dolphins—two on each side paralleling the main drilling platform—only one remained above the water line. This dolphin was out of position approximately 10 ft. and leaning against piling of the main platform. Under inspection of the submerged dolphins by a diver it was found that all three of them had fallen outwardly away from the platform, bending the 8⅝-in. piling in some instances and breaking some of the piling at the welds in other instances as they fell. These dolphins were straightened back up and piling redriven where necessary. It is believed a wider base on these dolphin jackets might add to their stability



AFTER.—Graphic evidence of the over-all damage suffered by the platform can be seen in this view. Highest recorded wind velocity at Freeport, Tex., 27 miles to the northeast, was 92 m.p.h. The lowest barometer reading was 29.

and prevent a reoccurrence of this in a similar storm.

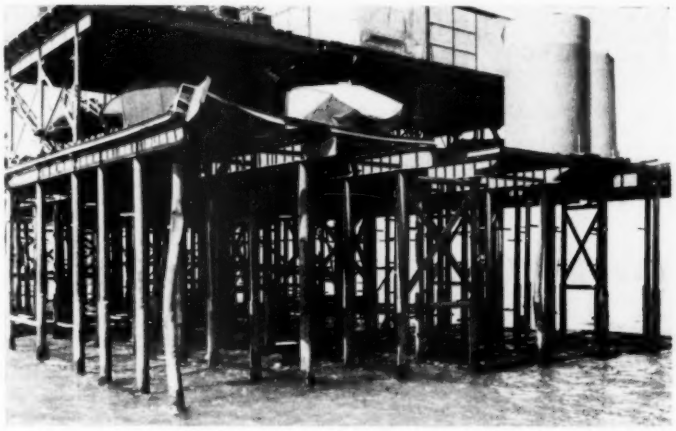
All of the walkways and landing platforms constructed of heavy expanded metal and framed with 3-in. angle iron were torn loose from their brackets which were welded to the jackets. Approximately 90 per cent of the abovementioned walkways were missing. A few pieces of this material were found bent around piling and jacket braces. These pieces were completely crumpled and twisted and draped around piling much like yard-wide strips of cloth might have been. This was surprising in view of the small resistance this expanded metal offered to the force of the waves.

The entire second deck or mud house deck upon which was located the cementing equipment was leaning approximately 3° to the northwest. Aluminum sheathing on the mud-house walls and roof was damaged 40 per cent with the gables at each end of the building appearing to have been blown outwardly as if from an explosion from within. The dry drilling mud and chemicals within the building were not extensively damaged from rain or spray as they most surely would have been had any great amount of rain occurred during the storm.

There was no damage to the 154 by 30-ft.-base derrick and 14-ft. 9-in. substructure; however, the engine substructure upon which the three diesel engines were mounted was shifted approximately 2½ in. from its original position. One of the slush pumps located under this structure was also shifted approximately 3 ft. before its further movement was obstructed by columns of the engine substructure, and it is believed that the impact of the pump as it struck these columns caused the substructure to shift.

The 30-ton stiff-leg derrick located on the main platform was shifted approximately 18 in. from its original position, shearing four 1½-in. bolts which secured the pedestal under the mast of this derrick. One of the diagonal legs of the stiff-leg derrick was buckled approximately 5 ft. from the top of the mast.

The 10-in. and 4-in. mud lines, fittings, and connections were disarranged and broken from the slush pumps to the mud tanks. By reason of these connections being broken off, the mixed mud contained in the three 6 by 8 by 30-ft. mud tanks was lost. Two of these tanks were moved out of position approximately 10 in. The slush pump weighing approximately 41,000 lb. and a diesel engine weighing approximately 22,300 lb. connected directly thereto, were shifted about 6 ft. from the original position on the main deck under the mud-house deck.



The Ohio platform stands in 47 ft. of water at mean low tide. The lower deck upon which these damaged tanks are located is 26 ft. above mean low tide. The second deck, or mud-house deck, is 40 ft. above this same datum.

The diesel engine was overturned and the radiator broken loose from the engine. The impact of the V-belt sheave of the slush pump against one of the 8-in. columns supporting the mud-house deck possibly could have caused the upper deck to tilt at the angle of 3° herebefore mentioned, and no doubt caused the shattering of one 11-in. piling below the level of the main deck where it was welded on to the jacket. This was the only internal piling damaged on the main platform.

There were only two 11-in. pilings broken completely loose on the main platform—the corner piling mentioned above in jacket No. 11 and the third piling from the corner in jacket No. 5. It is believed that the bunk house being thrown against the end of the main platform caused all of the damage to these two pilings; however, 15 pilings were cracked loose where they were welded to the cap beams on the outer perimeter of the main drilling platform. Most of the piling broken in this manner was near the southeast side of the platform. The one exception to this was the pile on jacket No. 5 which was shattered and out of line about 1 in. just above the point where the jacket was orange-peeled to the piling. This break was no doubt due to the impact of a slush pump against a column resting on this piling.

Located on the main deck level beyond the mud house were three 295-bbl. steel welded tanks and two low 250-bbl. bolted A.P.I. storage tanks lined up across the width of the platform. Two of the 295-bbl. welded tanks were approximately one-half full of diesel fuel and the third was completely full of water. The center tank of these three was lost overboard and the other two moved a few feet from their original positions.

The two bolted tanks were collapsed and were 100 per cent losses—one being moved from its original position to a point in under the mud-house deck. One of these bolted tanks contained 5 ft. of water and the other was full of water prior to the storm; however, the fitting and connections were broken off near the bottoms of the tanks which were empty at the time of the inspection after the storm.

At the pipe-racking end of the main platform several joints of 9⅝-in. casing was shifted laterally 5 or 6 ft. and one of the six horizontal water storage tanks was shifted laterally a distance of 8 in. The pipe-rack beams were bent in the southwesterly direction that the water tank was shifted, a distance of 10 ft. back from the edge of the platform.

Three-inch wood decking between the tanks was broken loose from the nailing strips and was missing. Approximately 80 per cent of the 3-in. wood decking and 3 by 8-in. nailing strips which were bolted to the deck beams with ⅜-in. bolts was torn loose; however, a considerable amount of this lumber remained on the platform. The 60-d nails in the 3-in. decking and the holes made by the ⅜-in. bolts in the nailing strips which were pulled loose by force of the storm indicated that the force applied to disarrangement this decking was vertical. It was observed that most of the nails and by far the greatest number of the ⅜-in. bolts were not bent.

3. General Discussion

J. Ray McDermott & Co., which designed Ohio's platform No. 2, obtained its technical data on wave action from Dr. Walter H. Munk, of Scripps Insti-

tute of Geophysics and Scripps Institution of Oceanography, University of California, who is considered an outstanding authority on wave action.

Designers of offshore drilling platforms generally agree that there is an urgent need for additional data on wave forces as they affect structures. Some of the data presently in use are based on studies made years prior to the advent of the drilling platform. Many competent engineers doubt the adequacy of the information at hand for use in determining wave forces to the degree of accuracy required for designing such structures. Present offshore development costs are near the economic limit, hence the need for reliable data as an aid to cost reduction by avoiding overdesign is critical.

It is believed that practically all of the major damage sustained by Ohio's drilling platform was caused by wave action and that only minor damage was caused by wind. To sustain this belief, there was ample evidence in the form of debris left on the platform after the storm had passed. It is believed that this minor wind damage would have been the only significant damage if the main decks of our drilling and quarters platforms had been only a few feet higher.

At the June 16, 1949, meeting of the Offshort Operators' Committee at Houston, engineers and others interested in offshore operations, representing 12 oil companies, discussed wave action at length. The discussion indicated that most operators thought that a further planned study of the problem, blueprinted by some qualified research organization, would be beneficial. Apprehension was expressed as to whether the platform presently in use might not be overdesigned or underdesigned for their intended use.

Representatives of all companies agreed that additional data on wave forces, to be obtained either by model studies or by actual measurements in the field, would aid tremendously in reaching the goal of designing a less-expensive and safer offshore platform, soundly adapted to fit into the pattern of economical limitations and hazards of the sea. It was also suggested that each company operating in the gulf install adequate automatic instrumentation on its platforms to secure actual field measurements in the event of a storm. If such equipment had been installed on our platform, invaluable data for the design of future offshore structures might have been obtained. The committee is still considering this project but it is believed an agreement will be reached soon on blueprinting a research program.

The Ohio platform stands in 47 ft. of water at mean low tide. The height of the quarters structure deck and the main drilling platform deck above the datum is 26 ft. The height of the second deck, or mud-house deck, on the main platform, is 40 ft. above mean low tide (14 ft. above the main deck). Fig. 2 shows the general features of construction and arrangements of the platform.

TABLE 1—WAVE CHARACTERISTICS NEAR GALVESTON, TEX.

(1) Mean depth of water, ft.	250	100	60	50	40	30	20
(2) Wave height, ft.	35	32	32	32	*32	*24	*15
(3) Crest elevation above mean surface level, ft.	17	16	16	16	24	18	12
(4) Maximum storm tides, ft.	0	0	0	2	5	8	12
(5) Maximum astronomic tides, feet above mean sea level	1	1	1	1	1	1	1
(6) Depth at calm which under worst storm conditions would result in depths in line (1)		99	59	47	34	21	7
(7) Elevation above mean water level during calm, which crests reach under worst storm conditions	18	17	17	19	30	27	25
(8) P/C_p at crest in lb. per sq. ft.	144	169	196	225	*2,300	*1,750	*1,100

*Waves have broken.

Based on a water depth of 50 ft., it was not expected that a wave height of over 32 ft. would occur at the site of the platform, or that any wave crest (measured from datum to crest) would be over 16 ft., plus the storm tide. (See Table 1, Munk's table.) A maximum storm tide of 2 ft. was expected in a 50-ft. mean water depth From the foregoing, the highest wave crest to be expected at the site of the platform was computed to be 18 ft. above mean low tide. Wave crests at least 8 or 10 ft. higher than expected were experienced during the hurricane. It is not possible to tell whether the wave crests or the storm tides were higher than computed.

The data used were derived from studies made on the Pacific Coast and as is well known, this coast line has a very rapid fall from shore line to deep water, while the Gulf Coast has a gradual slope to the edge of the Continental Shelf. It is believed that the latter condition might possibly have contributed to much higher storm tides than were computed by using present data to determine this factor. Our present knowledge of all the pertinent factors affecting this problem leaves much to be desired.

Our considered opinion regarding the actual happenings and resultant damage during the storm period at the platform is that the damaging waves occurred over a period of possibly 6 or 8 hours; and with a possible minimum of 3 hours' duration. It is believed unlikely that one or two exceptionally high waves did all the damage, although it is known that, under certain freakish conditions, wave intervals vary so that two or more waves might combine forces to form a single abnormally high crest; or they might combine to diminish one another so as to cause an exceptionally low crest.

Numerous small broken pieces of decking lumber remaining on the platform after the storm offer evidence to substantiate this belief. Waves occurring at intervals of 14 to 15 seconds, for a period of 2 hours' duration or longer; and causing 500 or more crests to break just under or at the level of the main platform could, and probably did, cause our damage, moving the machinery and houses only fractions of an inch at a time and eventually causing them to topple as the main deck support was torn away and the welds tying down the houses were broken.

Ohio Oil has an interest in another platform in the gulf between Galveston and Freeport and located about 45 miles northeast of platform No. 2. This platform has a height of 33 ft. above mean low tide, 7 ft. higher than platform No. 2. This platform experienced no damage on the main deck from wave action. Fortunately, the height of this platform was determined by the requirements of an LST drilling barge used in connection with it, and it is higher than was previously regarded as necessary to avoid damage from wave action.

The No. 2 platform was closer to the hurricane's eye, where higher wind velocities prevailed. However, the LST platform was also in its path and at such a distance from the eye to afford a greater fetch, which should have produced about the same wave crests. Because of its 7-ft. advantage in elevation, damage to the LST platform was limited to that occurring below the main deck. It is known that in the immediate area of a hurricane (as both these two platforms were), the height and period of the waves vary only slightly with different combinations of wind speed and corresponding fetch. Because of this fact, it may be concluded that Ohio would have suffered only minor damage in this particular hurricane (which, it is generally agreed, was not of major intensity) had the No. 2 platform been 5 to 7 ft. higher than it was.

Wind forces acting against a stationary object such as a drilling platform standing in the open sea become insignificant when compared with the tremendous pressures exerted by the accompanying wave action. Wind damage at our platform was limited to loss of a few sheets of gal-

vanized corrugated iron off the engine shed and the tearing and deformation of the thin aluminum walls on one side and at both ends of the dry-mud storage building. No waves reached the upper deck level where the shed and mud-storage building stood. The minor damage at that level was caused by wind.

On the lower or main deck, evidence was found that might cause one to conclude that at least four waves passed over the deck level. These waves combined with wind forces were of sufficient magnitude to move an upright 295-bbl. welded steel tank containing 250 bbl. of water for a distance of 5, 1¼, 2, and 8 in. respectively. (This is substantiated by semicircular marks cut into the decking by the edge of the manhole cover on the tank as it fell when each wave receded.)

A study of a report pertaining to a previous drilling site southwest of the town of Palacios, Matagorda County, Texas, shows that only one known wave over 27 ft. in height has been experienced in this area from 1898 to 1939. A further study of the upper Gulf Coast of Mexico shows that 64 hurricane or tropical storms passed through this area in the same 41-year period. These hurricanes ordinarily do not exceed 50 miles in width, but winds of gale force usually extend 200 miles or more from the eyes or storm centers. The forward movement has rarely exceeded 10 to 15 m.p.h.

A deep-water wave moving into shallow water causes the forward speed of the wave to be checked by the ocean floor contour, and resulting pile-up or fast increase in wave height is experienced. Should other obstructions such as rocks, reefs, or a drilling platform be in the path of such waves, further pile-up is occasioned. Storm tides are caused by extreme variations in atmospheric pressure combining with wind action and the pile-up phenomenon. Strong currents also extend the wave height. It is reported that the water level on one observed occasion rose at the rate of 1.4 ft. per hour to a height of 15 ft. above mean low-water level. From the foregoing, one may conclude that the less obstruction, the lower the waves and that round piling offers less resistance to wave pile-up than square piling.

Because of the pile-up phenomenon it is necessary to have some knowledge of the ocean floor surrounding the drilling site before erection of the platform is started. Thereby, the probable maximum wave height as affected by local conditions could be predicted, and the drilling platform erected to the height considered safe for the area.

It can be observed from a study of the Pilot Chart of Central American Waters, No. 3500, an excerpt from which is Fig. 1, that three currents converge, or tend to do so, in the vicinity of Ohio's No. 2 platform. Considerable difficulty was experienced with quite severe currents during the erection of the platform this past summer. The salvage work was delayed on several occasions because of these currents, which make it impossible for a diver to work on the ocean floor except for a few hours each day. The strongest current parallels the shore for most of the year and the second current merges with it in the vicinity of the platform at angles varying from month to month between 30° and 90°—causing an unusually turbulent sea where they meet. A third current originating in the Sigbee Deep extends north-northeast into the area but tends to change direction more often than the two stronger currents.

The hurricane season is considered to extend from June to mid-October. Rough seas and weather are experienced from early November into March and April. The calmer period extends over the intervening months, but after June may be broken by local squalls and hurricanes. In the case of drilling barges, as much as 15 per cent of the drilling time has been lost due to adverse weather conditions, while lost time on completely equipped drilling platforms has averaged approximately 1 per cent. In the erection or dismantling of a drilling structure, Ohio has experienced a time loss of over 38 per cent due to adverse weather conditions.

The standard weather forecast does not contain all the information an offshore operator desires or needs, especially as regards the state of the sea. It has been noted many times during the past year that small-craft warnings would be hoisted in the Galveston area while a relatively calm sea prevailed at both the drilling platform and terminal. At other times, a moderate weather forecast would find the water in these vicinities much too rough to load or unload a cargo boat. This was due to the wide general area covered by the standard weather forecasts which do not allow for variations in the much smaller area confined to Ohio's shore installations and offshore drilling platform.

It is hoped Ohio's radar equipment will aid in locating local disturbances such as so-called "line squalls," and in more accurately determining weather conditions to be expected, on a short-time basis, in the immediate vicinity of the platform.

Everything being considered, there was comparatively little major structural damage to the main drilling platform. By far the most expensive damage suffered was the loss of the quarters and galley houses and damage to their supporting structure. It is believed some of the damage of the main platform was caused by the bunk house striking against the end of the structure after it was washed into the sea. Although there are some details yet to be cleared up in regard to the final tabulation of damage, the following figures cover their cost in so far as can be ascertained at this time:

Cost of tangible materials lost	$94,094.57
Intangible cost of repairs, including all labor and rentals for boats, barges and other marine equipment used	111,500.00
Total	$205,594.57

As Ohio's insurance policy covered only the platform and not supplies and equipment the above figures do not include such items as furniture and fixtures, water tanks, butane tanks, and anchors.

Three 295-bbl. steel welded tanks and two low 250-bbl. bolted A.P.I. storage tanks were lined up across the width of the platform before the storm. After the storm, the center tank of the three welded vessels was gone and the other two moved a few feet from their original position. The two bolted tanks collapsed and were 100 per cent losses.

EXPERTS IN SEVERAL FIELDS TURNED TO BY THE ENGINEER CONFRONTED WITH PROBLEMS OF DESIGN OF . . .

Offshore Drilling Platforms

by C. Glenn Cappel

THE engineer confronted with the problems of the design of an offshore oil-drilling platform turns to the oceanographers for wave action; to the meteorologists for storm data; to the driller for arrangement of equipment; and to the petroleum engineer for conditions of depth of drilling, etc., which affect the loading of the platform.

In order to undertake the design of one of these platforms we need to get from the oceanographer the expected wave and water conditions during a storm of such magnitude as is contemplated in the location, usually taken as the maximum probable, not theoretically possible. This information should include:

1. Plus storm tide
2. Wave height
3. Wave height above quiet-water surface
4. Wave length and period
5. Horizontal water velocities from the surface to the bottom at the crest, the node, the trough, and several points in between, including the direction of flow
6. The wave form.

Next he turns to the meteorologist (who is sometimes also the oceanographer) for storm expectancy, direction, frequency, and violence. The exact location of the particular platform will have great bearing on the findings of both the oceanographer and the meteorologist.

Now we come to direct loading as imposed by drilling operations. The engineer will find that there are many arrangements of equipment and details of operation. In any case he has to meet the conditions anticipated.

The petroleum engineer specifies the depth to which the hole is expected to be drilled. This governs the probable load transmitted to the platform by the derrick. Sometimes it is expedient to design the platform for the full capacity of the derrick, but if shallow drilling only is anticipated, the platform can often be accommodated to these lesser loads. It should not be overlooked that two of the lines making up the reeve of the traveling blocks are cumulative as far as the derrick is concerned, but compensating insofar as the load brought to the platform is concerned.

Wave forces are momentary; wind forces are intermittent as are derrick loads. The fixed loads are the weights of the structure, machinery, supplies, pipe, etc. It is probable that we will eventually give consideration to the inertia of the mass in regard to the momentary wave forces, but at present our data are insufficient confidently to take this into account.

To date we get a wide variation in prognostication of wave heights, lengths, and water velocities. Undoubtedly, opinion will crystallize as we progress and we will get closer agreement among the various specialists. Some of the values for water velocity, particularly at the bottom, I question. The gulf bottom is mostly blue clay deposited by the littoral currents from the outflow of the Mississippi River. Such a bottom just would not tolerate the velocities predicted by some. I think we need to do a little rationalizing here.

Storm tides in the open gulf up to 9 or 10 ft. have been advanced in some quarters. Here, too, I think we should do a lot of rationalizing. Such plus tides are experienced at the shore and in landlocked bays and lakes; out in the open gulf, I think not.

Wave heights are also a point of wide variation. I have seen estimates of from 18 to 40 ft. at the same location. The hurricane of September 1948 off Grand Isle, La., generated waves whose crests were at plus 25 in about 40 to 50 ft. depths of water. The storm tide was probably in the nature of 1 or 2 ft., judging by the plus tide at the island. This would indicate a shallow water wave of some 30 to 32 ft. in height. Here again I think the engineer has to do some rationalizing and local history research.

Wind-Force Determination

Wind poses much less uncertainty. We have long had design premise in regard to wind forces which have been used successfully. One of the most striking examples of wind-force determination was experienced at a Florida location a few years ago. During this hurricane buildings designed for 30-lb. per sq. ft. wind force collapsed and those at the same location designed for 50 lb. per sq. ft. were undamaged. In our designs we have used 50 lb. per sq. ft. on the net exposed surface for offshore platforms.

It is apparent that the fixed loads can and probably will be moved and changed, so the engineer must either provide for the machinery and other equipment in any location or so circumscribe the possible rearrangement that he will be assured of no overloading.

The engineer should determine, if possible, from the owner whether there is any possibility of changing a shallow well to a deep well to be drilled from the platform. If this can not be done with certainty, then the design should be accommodated to maximum conditions of loading.

When we designed and built our first (which I believe was the first in the Gulf of Mexico) offshore drilling platform in 1937, we had no background of experience and very little precedent to guide us. The location

The Author

The author is vice president of Horace Williams Co., Inc., engineers and contractors of New Orleans, with which firm and its predecessors he has been in a similar capacity for the past 30 years. A native of Louisiana, Cappel received his B.S. degree in civil engineering at Louisiana State University in 1912. He also took postgraduate work at Rensselaer Polytechnic institute. He is a member of American Society of Civil Engineers and Louisiana Engineering Society, and served as president of the latter organization, as well as the Louisiana section of the A.S.C.E. Presently he is national director of the A.S.C.E. from District 15, which includes Louisiana, Texas, New Mexico, and Mexico.

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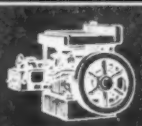
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was 6,000 ft. offshore in about 13 ft. of water, but 10 miles from nearest harbor, and open to the gulf. No barrier islands intervened between the platform and the open gulf. The structure was of creosoted piling and timber. The equipment was of typical inside type; that is, it was not seagoing equipment. The lost time during construction on account of weather was about 75 per cent. We lost through storms a considerable amount of equipment. The platform has been damaged by storms and overloading, but has served its purpose, probably by virtue of the fact that it has never been in the direct path of a real hurricane.

Our studies started with that platform. We reviewed the history of hurricanes which struck on this coast. We visualized the type of equipment which would best suit such an operation. We looked ahead to the time when the oil companies would start prospecting the Continental Shelf. We laid our plans as far as we could without the detail data as to location, depth of water, loading and so on.

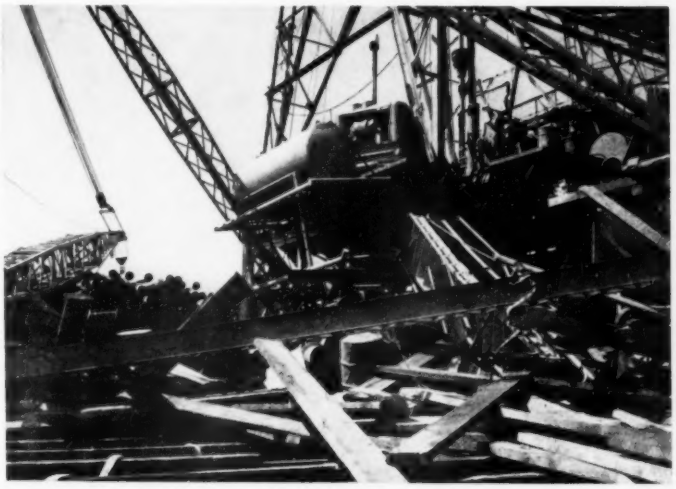
So, when 1946 brought the oil companies to the brink of exploring the gulf bottom, we were ready with all our forward planning and thinking already done. The year 1947 saw the congealing of the oil-company programs.

Planning the Platform

We planned a platform structure which would offer the least resistance to the flow of water, one which was high enough above water as to escape the forces of the waves—a structure which would tolerate all the forces to which we visualized it would be subjected. We gathered the data as outlined above and in the light of these data and our experience in living through hurricanes here, we designed in detail the platforms which we subsequently built, of which there have been approximately 20.

We designed the equipment, seagoing type, to fit the operation. The design of the platform and the equipment was complementary. The lost time on account of weather over a period of 2 years is considerably less than 10 per cent.

We determined the height of the deck of the platforms by visualizing a 32-ft. wave, plus 24 and minus 8 superimposed on a plus 4-ft. storm tide in open water, adding 2 ft. for extra safety. We started the deck structure at plus 30, finishing the deck at about plus 35 above normal water. As pointed out above, the highest waves experienced so far have been crest at plus 25. A hurricane of longer duration would probably have built up the tide to a point where the expected plus 28 crest would have been reached. None of the platforms which we have designed and built have been damaged by storms, although a number of them of various sizes have been subjected to a hurricane of certainly not less than 80 per cent of the maximum which has occurred in the known history of this coast.



Approximately 80 per cent of the 3-in. wood decking and 3 by 8-in. nailing strips, which were bolted to the deck beams with ¾-in. bolts, was torn loose. However, a large amount of the lumber stayed on the platform. A study of the nails and bolts indicated that the force which tore the decking loose was vertical.

Some of the platforms are built as fully contained structures; that is, all machinery, supplies, and quarters are located on the platform. Some of them are planned for use in conjunction with a hull or vessel moored in close juxtaposition which houses supplies, materials, and crew. In either case, the engineer should recognize the fact that storm-tossed vessels develop tremendous striking power and it is our opinion that the only practical approach to the problem is to so anchor the vessels, whatever they may be, that they never come in contact with the platform structure. We do not recommend any type of fender, either integral or separate, as such a fender can not within ordinary economy be built strong enough to be effective, and it is an invitation to moor vessels alongside, which is inviting danger.

Where steel is used in the construction of these platforms, the question of corrosion protection is of vital importance. In addition to various other methods, we have employed the principle of providing additional thickness of metal, which is to give added life after the usual surface protections have been dissipated where replacement is not practical.

Crew quarters and mess-hall building were washed into the gulf.

The 30-ton stiff-leg derrick on the main Ohio platform was shifted approximately 18 in. from its original position, shearing four 1¼-in. bolts which secured the pedestal under the mast of this derrick.

The author is manager of the marine department, Langham, Langston & Burnett, Houston. He has been identified with the problem of development of new forms and types of insurance necessary to secure adequate coverage of offshore operations since 1948. In 1949 he flew to England at the request of underwriters of Lloyds of London to discuss insurance problems confronting the oil industry with respect to coverage of offshore ventures in the Gulf of Mexico. A Canadian by birth, Pike was educated as a marine engineer and he has a background of actual experience in marine operations. He is a veteran of both world wars, and was superintendent of shops at the Naval Proving Grounds at Davisville, R. I. The information in this article is condensed from a report prepared for underwriters in the New York and London insurance markets.

An Insurance Counselor's Views on Offshore Risks

by J. Everett Pike

EACH separate offshore drilling platform is a specific risk unlike any other, no matter what its location might be.

Basically, it becomes apparent that the only sound way design and orientation of an offshore drilling structure can be predetermined accurately is through the use of expert oceanographic consultants in making a report of the pertinent factors involved at the site selected. Foremost among these would be the expected maximum height of a hurricane-storm wave crest.

Purpose of efficient design for those portions of offshore structure which are acted upon by wave forces should be the same as that of all designs which deal with frictional forces of a fluid on a solid. In the case of a fixed structure (platform), the force is produced by the water moving past the structure. In all cases therefore, the better design is that which offers the least resistance to the opposing forces.

Granting that the above is true, all network superstructure such as crossbracing should be kept at a minimum and at as low an elevation as possible so that it will not experience the pressure exerted at the top of a breaking wave. Likewise, the main deck and substructure in connection therewith should be high enough above mean water so that the probable percentage is that storm waves will never break against these portions of the structure.

In view of the damage sustained to the Ohio platform, it seems imperative that designs which employ a mass of interlacing crossbracing below the surface of the water should be further studied to determine whether or not there is formed a water crib which acts against the opposing forces of an oncoming wave in a manner similar to a breakwater, thus preventing free movement of water through the structure causing ordinary waves to break at or under the platform.

Evidence produced would emphasize the importance of further studies to determine the accuracy of data at hand and now used in determining wave forces. Cooperative research and instrumentation of existing offshore structures is essential toward supplying the answers on which to base accurate formulas for future use in design.

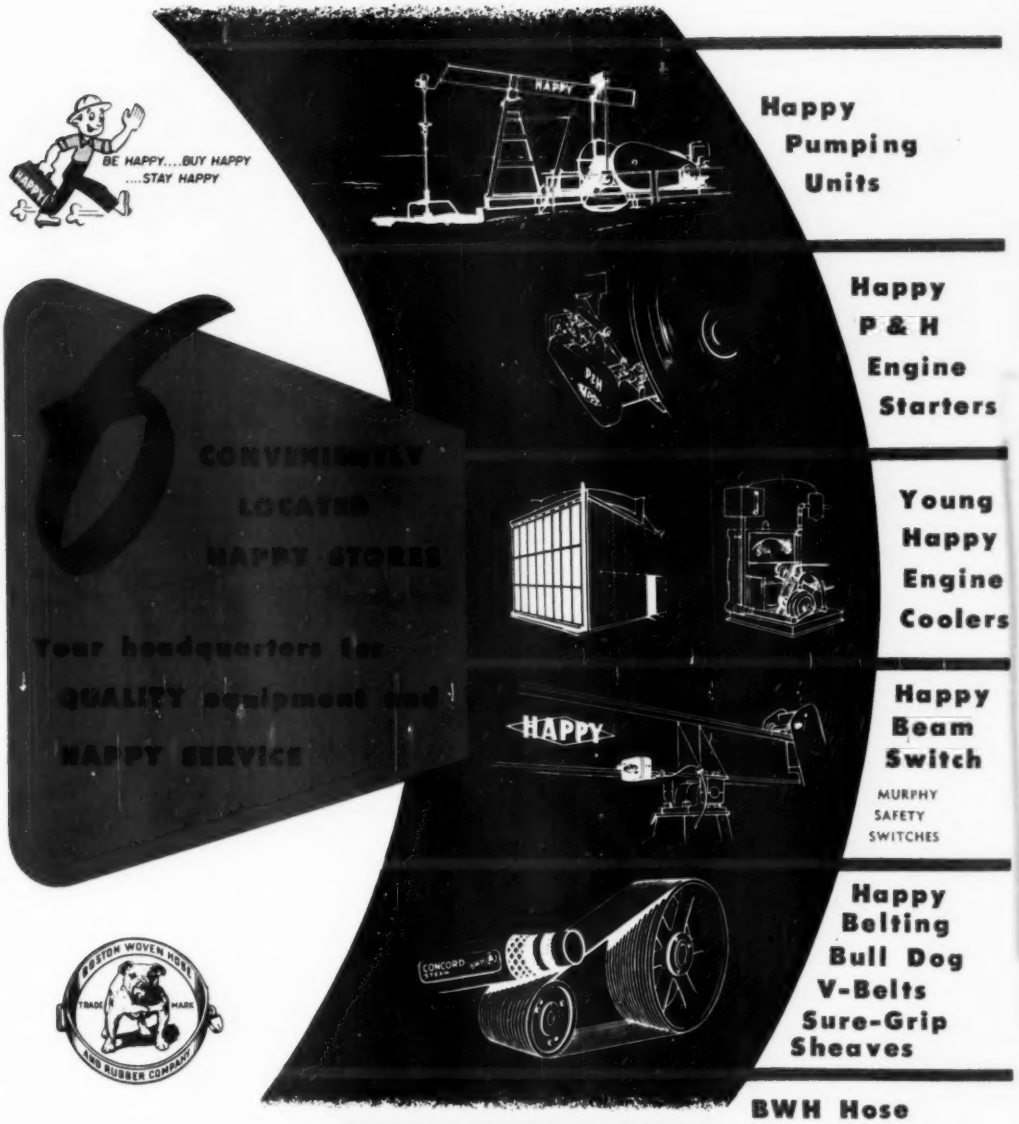
For the purpose of evaluating wind forces acting on the design of offshore structures, we must consider a platform containing all of the housing necessary to store supplies and provide living quarters for the personnel. Also, we must be concerned with an unguyed derrick some 145 ft. in height above the derrick floor.

Wind forces might be divided into three classes: (1) tropical hurricanes that occasionally strike the Gulf Coast; (2) so-called Texas northers, and (3) gulf line squalls.

Competent engineers have been dealing with wind forces on structures for many years and specialists have worked out formulas to apply to the design of offshore structures. Suffice it is to say that it has come to be common practice to design with a wind-load rating of 125 m.p.h. In dealing with wind forces, recognition should be given to the design of floors, tanks, and houses superimposed on these structures to be sure they will not act just like an air foil and simply be lifted off the installation.

Drilling derricks, machinery, and superstructure superimposed on top of the drilling platform are not exposed in the same degree to the hazards involved as is the platform. In brief, from an insurance point of view, these are the better risk and should enjoy preferential treatment with respect to the rate charged.

It should be taken into consideration, however narrow the viewpoint might seem, that certain insurance-company executives will be concerned lest the offshore operators will use insurance companies in the experimental stages of their operations and later drop their insurance when their operations in the gulf have passed that phase and become self-insured. Most certainly such action will take place if the insurance companies continue, for the most part, their intran-



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sigent attitude toward the problem.

Rather, the insurance industry's attitude should be one of cooperative effort to aid and assist in these new endeavors to the end that through assistance it could build for itself a firm foundation for the retention of profitable business. It would seem to this writer that it would not be asking too much of the insurance industry, through such effort, for it to actively participate and financially assist in research programs now being inaugurated, the main purposes of which are to determine factors on which to base engineering designs and which are to introduce safety features in the future.

Immediate attention should be given and the influence of the insurers exerted and directed toward the formation of an insurance committee to operate within the framework of the Offshore Operators Committee. This committee should be composed of men from both the oil and gas industry and the insurance companies, and would act as liaison between the operators and the insurance companies, so that insurance requirements might be more fully understood and provided for, where desired. This best can be done now while thinking is fluid and designs and methods of operation are scarcely beyond the experimental stages.

The greatest single factor in design of an offshore structure, other than structural strength, is its height above normal mean high tide so the deck will escape the top of a breaking storm wave crest. No fixed height can be determined for all; proper height will vary with each location; generally speaking, however, the tendency has been to build too low. It is certain that a few additional feet on the height of the Ohio platform would have lessened materially the loss sustained. It is quite possible that the loss would have been prevented.

In order properly to underwrite an offshore risk, the underwriter must be in prior possession of all pertinent information such as location, blueprints, specifications, oceanographic surveys, meteorological service used, shore base for operation, dates of proposed operation, and other factors. With full and complete information at hand, he must be capable of interpreting all into an equitable rate to be charged for the insurance he has been asked to supply.

It has been suggested that the industry establish a technical society, similar to the American Bureau of Shipping, for the purpose of setting up a code of rules for classification. This idea does have a lot of merit, but only if its purpose is to establish procedures and minimum standards and, thereby, assist the underwriter in designing forms of insurance at equitable rates to meet the requirements of the industry today and tomorrow.

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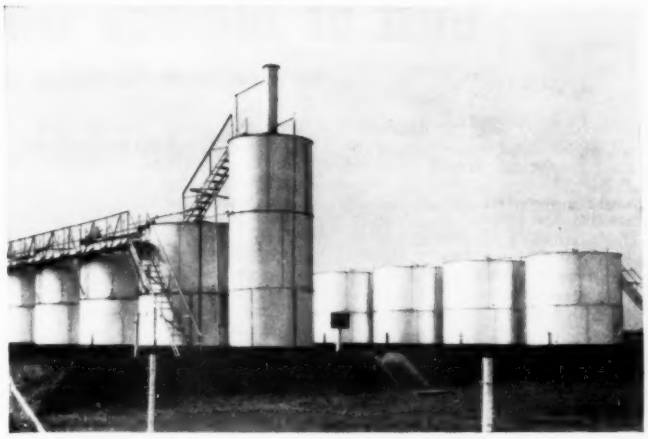

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Stanolind Platform Also Tested in Gulf of Mexico Hurricane

by Benjamin K. Ayers, Jr.

ON October 3, 1949, the destructive force of a hurricane struck the drilling platform operated by Stanolind Oil & Gas Co. The hurricane moved rapidly north out of the Gulf of Mexico.

This platform is located at Lat. 29° 03′ 16″N, Long. 94° 55′ 38″W on State Lease 31700, Tract 245, in the Gulf of Mexico, approximately 7 miles offshore, Galveston County, Texas, near San Luis Pass. The structure is composed of nine 30-in. o.d. steel piling braced by 1½-in. prestressed steel bridge cables and capped by twelve 30-in. span trusses which carry the main deck loads.

Normally this platform is tendered by a converted LST which provides storage facilities for pipe, mud, cement, and other drilling supplies and also provides eating, sleeping, and recreational facilities for the drilling crews. This vessel had slipped her moorings when advised of the approaching hurricane and headed for the safety of Galveston Harbor, leaving the platform secured and unmanned in the path of the hurricane.

As a result of this hurricane, this joint offshore drilling structure of Stanolind-Melben-Ohio sustained only minor damage. The successful test can be attributed to two factors: (1) the platform was supported by large-diameter piling on 30-ft. centers with cable bracing which offered little resistance to the waves, and (2) the main deck and all major equipment were more than 33 ft. above mean high tide.

Platform Severely Buffeted

The eye of hurricane was tracked and plotted by the weather bureau as passing in close proximity to Freeport, while on a due northerly course. Since the center of the storm was approximately 50 miles in diameter and the eye passed just west of location, the platform at some time during Monday evening, October 3, 1949, was subjected to the worst wind and wave forces to be produced in the area. This is because in the northeast quadrant of such a storm the peripheral winds are augmented by the speed of the advance of the center of storm and these same winds are unhampered in building up heavy seas as they are in the other quadrants.

On Tuesday, October 4, the derrick was clearly seen from shore and no attempt was made until the following day to make a closer inspection. On Wednesday, both a plane and boat were dispatched to the platform to allow for a closer inspection. The damage appeared to be of a minor nature with no evidence that the main deck had been inundated by wave action.

On Thursday, October 6, the drilling crew returned to the platform accompanied by an engineer. A preliminary survey disclosed the following damage:

1. One personnel landing ramp was completely torn off (located on the weather side of the platform).
2. Under the main deck, all catwalks which ran NE by SW were bent and twisted out of alignment—particularly the hand rails, but those running SW-NW were little damaged.
3. The pump section of the deep well fire pump was broken off below the water line and missing.
4. The canvas house over the engines was badly ripped and one supporting stanchion torn loose.
5. Several cable braces were loosened and the protective wrap damaged, probably by floating debris.
6. Conductor pipe well template for Nos. 3 and 4 wells had been torn loose from the bottom, denuded of its deck and tipped over against the cable bracing. (The conductor pipe well template for Nos. 1 and 2 wells appeared scarcely damaged, save for loss of its timber deck. It was strengthened by the two strings of casing set through it).

The above damage has been estimated at about $24,000. Of this amount, two-thirds can be attributed to the loss of the conductor pipe template, which had a timbered deck secured in place with ⅝-in. U-bolts at 21 ft. above the water. In the future these subcellar floors or decks will be open grating planked over with timber which will be either free or lightly wired down. With this practice, the damage to the platform would have been reduced to about $8,000.

Benjamin K. Ayers, Jr., is marine planning and research engineer in Stanolind Oil & Gas Co.'s Houston division office, where he has been since July 1948. He received his A.B. in geology from Dartmouth College and his M.S. in civil engineering from Thayer School of Engineering. Most of his marine experience was gained while in the Navy as a tug captain and later as a ship salvage and diving officer in the Southwest Pacific and Manila.

Stanolind's nine-pile platform off San Luis Pass looking from the side normally occupied by the LST tender. The inclined template under the left side of the platform is damaged conductor pipe template for Nos. 3 and 4 wells not drilled as yet.

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Straight-from-the-shoulder-facts every oilman should know about

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Because of its apparent simplicity, many rule-of-thumb methods of judging Drill Collars have sprung up over the years—misunderstandings that cost the industry thousands of dollars in unnecessary losses every year. In a sincere effort to clear up some of these inaccuracies, Baash-Ross Tool Company—one of the largest and most experienced producers of quality Drill Collars—herewith summarizes some of the most important facts *every* oil man should know about Drill Collars . . .

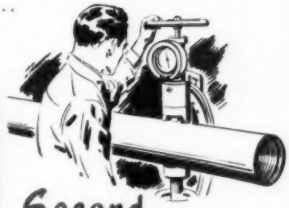
First in selecting the steel to be used in a Drill Collar, chemical specifications alone are not enough!

For example, simply to specify that a Drill Collar should be made of 4142 alloy steel—or any other AISI specification steel—permits far too great a variance of alloys to obtain uniformity of the required physical properties in the finished product.

Alloys that produce uniform properties when used in small cross-sections produce entirely different sub-surface properties when used in a thick-walled product such as a Drill Collar. Therefore, the steel used in Drill Collars should be selected by the "hardening characteristics" as well as by chemical specification.

Baash-Ross does this by checking the "End Quench Hardenability" index of each individual heat of specified steel to determine exact hardening characteristics. Then, based on this test, each heat of steel is separately classified as to the size of product cross section that particular steel is to be made into to secure the desired uniform physical properties in the finished product.

Thus, by preselecting the steel for each Drill Collar by its individual hardenability characteristics—not by generalized chemical specifications—Baash-Ross assures each Drill Collar having the correct sub-surface as well as surface properties in the steel.



Second specifying that the Drill Collar is to be of press forged steel is not enough!

Although forged steel is denser than rolled steel, the really important thing is how the forging is processed—the way it is heat-treated to develop the forging to its best physical properties.

Through years of experience, Baash-Ross has learned that these processing steps are quite critical and must be accurately controlled to produce a Drill Collar free of structural defects and residual stresses. First, the forged bar is normalized and tempered over its entire length in one operation to produce a homogeneous structure and stress-free physical properties.

After the bar has been machined to the specified outside and inside dimensions, each end of the Drill Collar is again treated by an oil quench and tempering operations to produce the required uniform physical properties necessary for the threaded end zones.

Thus, a forged Drill Collar is produced that is free from residual stress to assure sustained straightness—with high impact values to resist shock loading—and with the end zones of such uniform physical qualities as to permit repeated recutting of the threaded ends without reduction of original joint strength!

Third specifying the size and type of joint desired on the Drill Collar is not enough!

Almost any machine shop can cut joints that will reflect proper gage standoff and will thread together, but the important thing is whether the joint is machined to obtain its full designed efficiency. Joints that are not produced with accurate thread form, lead and taper will permit wobble and cause failure. Furthermore, joint alignment in Drill Collars is particularly important because the rigidity of these members concentrates misalignment stresses on the pin portions and is the most common cause of joint failure in Drill Collars.

Baash-Ross assures accurate thread form, lead and taper in every joint by a prescribed method of checking and gaging that goes far beyond standard gaging standoff tests. Then the alignment of every joint is precisely checked with a Baash-Ross Alignoscope* to assure its not varying by more than 1/10 of 1% of theoretically perfect with respect to the longitudinal axis of the Drill Collar—virtually perfect alignment!

**For descriptive details see page 463 of your 1950 Baash-Ross Composite Catalog.*

These, too, are important specification features!

Although the above data outlines some of the principal points to look for in Drill Collars, these are vitally important, too . . .

▶ **STRAIGHT, CONCENTRIC BORE:** All Baash-Ross Drill Collars are held to wall-thickness specifications so rigid that, for a 2¼" bore or larger, the wall must not vary more than 1/16 *inch* for each 10 *feet* of product length—and the bores must be free from shoulders and other irregularities.

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For additional important data on the many rigid specifications to which Baash-Ross Drill Collars are held, see pages 407 and 408 of your 1950 Composite Catalog. Or write direct for complete details.

Protect yourself and your well by insisting that every Drill Collar you buy meets the specifications outlined above. They represent the most dependable method we know of securing a uniformly good Drill Collar!

New, Safer Specifications Will Result From Experience in 92-M.P.H. Blow

by M. B. Willey*

THE hurricane which swept a portion of the Texas Gulf Coast on October 3-4, 1949, did considerable damage to the offshore drilling structure of Ohio Oil Co. As soon as weather conditions permitted, the structure was examined by many engineers in an effort to determine how and why the damage was done and from these conclusions develop new and safer specifications to control future designs.

Although there was some disagreement among the engineers regarding various phases of the mishap, a number of features were readily apparent and will no doubt greatly influence the general design of future drilling platforms. Obvious was the fact that the lower deck of the Ohio structure was of insufficient height. Unquestionably, the crests of a number of waves were several feet higher than this deck.

Pacific Coast Study

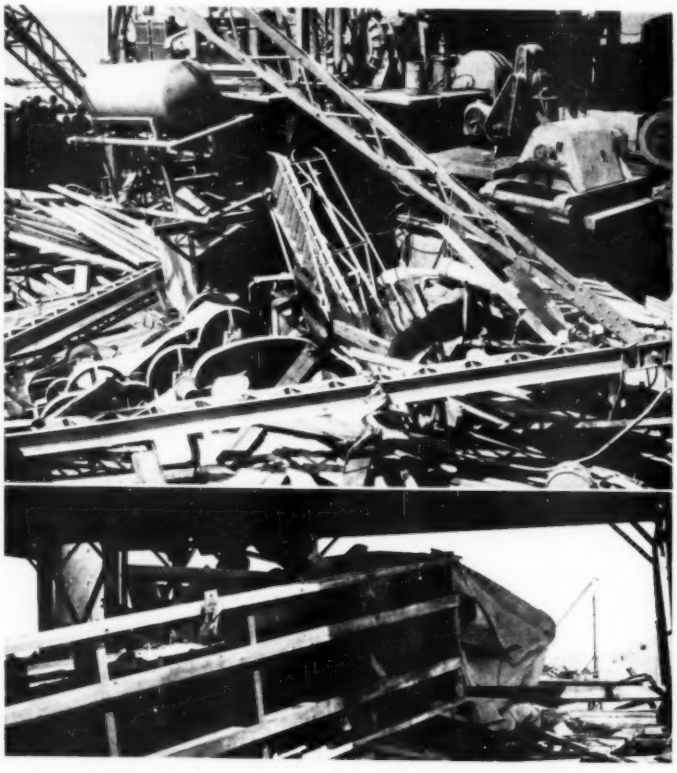
Most of the experiments and formulas developed for predicting maximum wave conditions resulted from study and research made off the Pacific Coast where conditions are very dissimilar to those on the Gulf of Mexico. The main difference consists in the precipitous slope of the shore or practical absence of any shelf as compared with the long, gentle slopes and a shelf of great width in the Gulf of Mexico. Hurricanes having their paths somewhat parallel to this shelf would have a considerable distance and time in which they might travel over very shallow depths of water. The result apparently, is to pile up waves of greater height than have been expected on top of storm tides, much in excess of authoritative predictions. Future drilling structures, especially those in proven, productive territory, can be expected to have decks much higher than those previously constructed in the Gulf of Mexico.

There was little or no damage at the structure which could be directly attributed to horizontal wave forces and only minor injuries were wrought by the wind. Although this hurricane was not of major intensity, the above fact leads one to believe that the designs now in use are satisfactory. Structures so constructed will remain intact in even a severe hurricane, provided the decks and other flat surfaces of considerable area are out of reach of the wave mass. The fact that, at Ohio's structure, machinery of great weight located upon the flat, horizontal deck surface was overturned and moved a considerable distance and the deck torn away from the beams, would indicate that most of the damage was done by vertical forces.

Difficult Study

It is difficult to conceive of a structure having a flat deck of large area being designed of sufficient strength to withstand the terrific impact of a considerable portion of the crest of a long, high wave coming in contact with it. Unquestionably, it would be more economical to extend the deck upward a sufficient distance so that it would be out of the reach of the wave. Just what this elevation is, in various depths of water, with different bottom contours and many other conflicting conditions, is truly difficult to determine. Heights in excess of this limiting maximum unnecessarily increase the cost of the structure.

The necessary study and research to determine this minimum deck elevation, actual forces encountered, etc., should be carried out even though the results may not be available for several years.



Top: This general view of the lower deck of the main Ohio platform gives an indication of the extensive damage. Bottom: One of the slush pumps was turned over and shifted approximately 3 ft. before being stopped by columns of the engine substructure.

*Chief engineer, J. Ray McDermott & Co., Inc., New Orleans.

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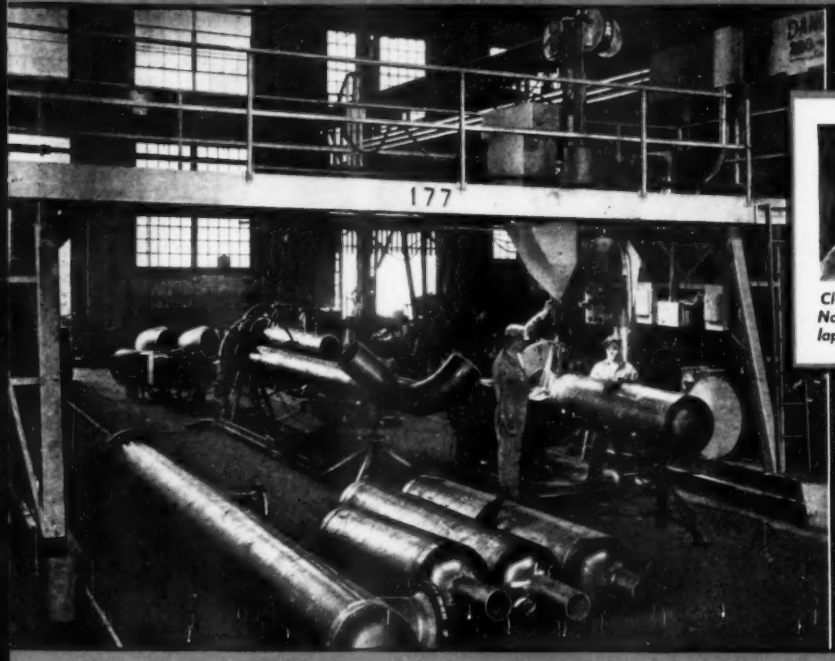
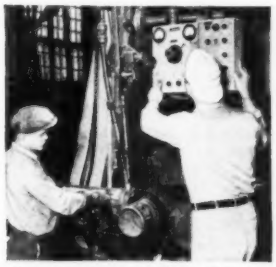


Closeup of the weld being laid. Note smoothness of the overlapping beads.

Movable bridge transports welding head and equipment over the various work rotating machines. Operator is shown adjusting flow of flux that submerges the arc; helper cleans weld with chipping hammer as it rotates past him.

by MIDWEST MACHINE WELDING

WITH SUBMERGED ARC



Operator stops machine at completion of weld by simply pressing button. Push button controls position welding head exactly over work clamped in rotating machine.

Better welding is assured by this Midwest development because the "human element" has been eliminated for all practical purposes. Aside from work positioning, the operator simply starts and stops the machine; his helper chips off the slag . . . all else is automatic.

Quality of the weld is improved because the machine follows the predetermined procedure *exactly . . . everytime.* The puddle is larger and the arc is better shielded and controlled. The possibility of locking up slag is minimized while undercutting is practically impossible. The greater number of beads is a further improvement.

This application equipment, developed and built by Midwest for use in its own fabricating plants, is representative of the modern facilities used by Midwest to assure better piping.

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Preliminary Report on

Oceanographic and Meteorological Factors

involved in damage to offshore drilling structures

by Dr. Irving P. Krick

IN addition to the routine sources of data a large number of wind and barometric observations taken at half-hourly and sometimes quarter-hourly intervals were studied to determine the path and intensity of the October 3-4 hurricane.

Analysis of records and radar data supplied by Dow Chemical Co. indicated that this hurricane passed inland across Cedar Lake and continued northward, passing between Brazoria and Lake Jackson. The center passed some 15 miles to the east of the Ohio-Melben platform site and some 29 miles to the west of the Stanolind Oil & Gas Co. site.

In order to compute wave characteristics at the two structures, it is first necessary to know the distribution of surface-wind velocities within the hurricane. All available wind reports during the storm were plotted according to their position with respect to the hurricane center as shown in Fig. 1. The notation A refers to reports from Dow Chemical Plant A, B refers to those from Dow Chemical Plant B, and G to those from Galveston. Using these plotted data and the known pattern of winds around a hurricane, it was possible to construct isopleths of wind strength (lines of equal wind velocity) with a fair degree of accuracy. The wind-direction field was also determined through use of the available data and the ideal pattern.

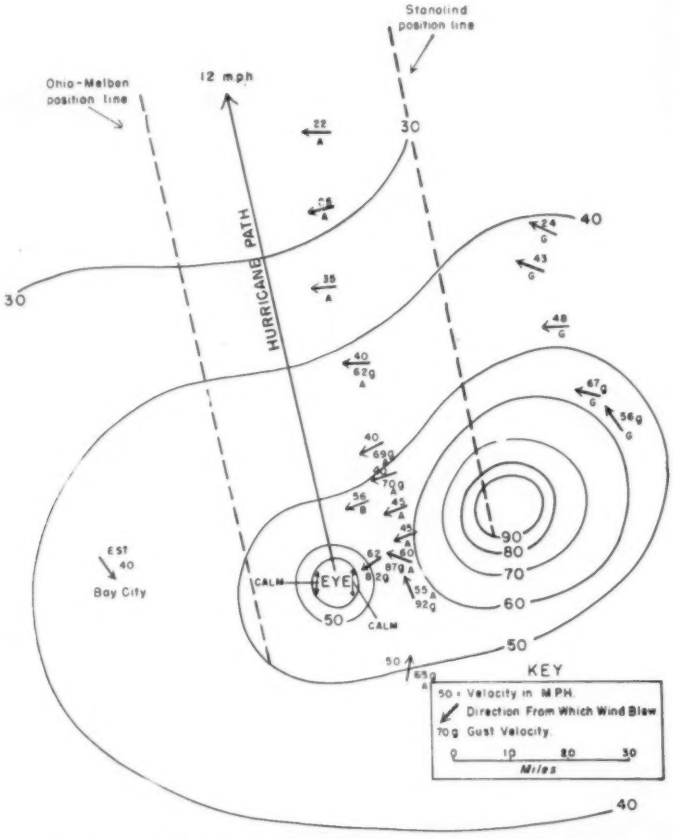

Fig. 1—Wind-velocity field (m.p.h.) around hurricane of October 3, 1949.

The author is professional meteorological consultant and president and chairman of board of trustees, American Institute of Aerological Research, Pasadena, Calif.; chairman and managing director, International Meteorological Consultant Services, Ltd., London, England. He was born in San Francisco, received his A.B. in physics at University of California in 1928, M.S. in meteorology at California Institute of Technology (1933), and Ph.D. at Cal Tech in 1934. He was faculty member at Cal Tech 1933-1948. This report was prepared for Langham, Langston & Burnett, insurance counselors, Houston.

Sea Condition at the Two Sites

A technique for accurately forecasting wave conditions from the wind field was developed during World War II. Through the application of this technique to a 40-year archive of weather charts, "hindcasts" of wave conditions in the gulf area have been made and summarized. These give the frequencies with which various critical wave conditions can be expected.

This technique was used to predict wave characteristics at the Ohio-Melben and Stanolind locations in absence of actual reports during height of the hurricane. By selection of a number of "fetches" over which winds of a certain average strength blow for a certain time, the various combinations of wave characteristics at the two sites were ascertained.

Because of trajectory and speed of this storm, it was possible for a set of waves to travel along with the storm for a considerable period of time in its right-hand sector. Due to this, the waves continually increased

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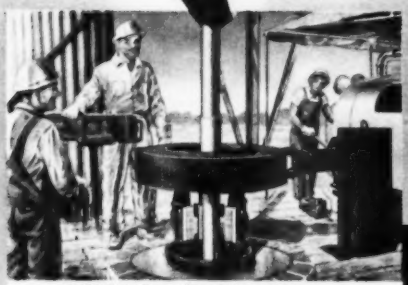

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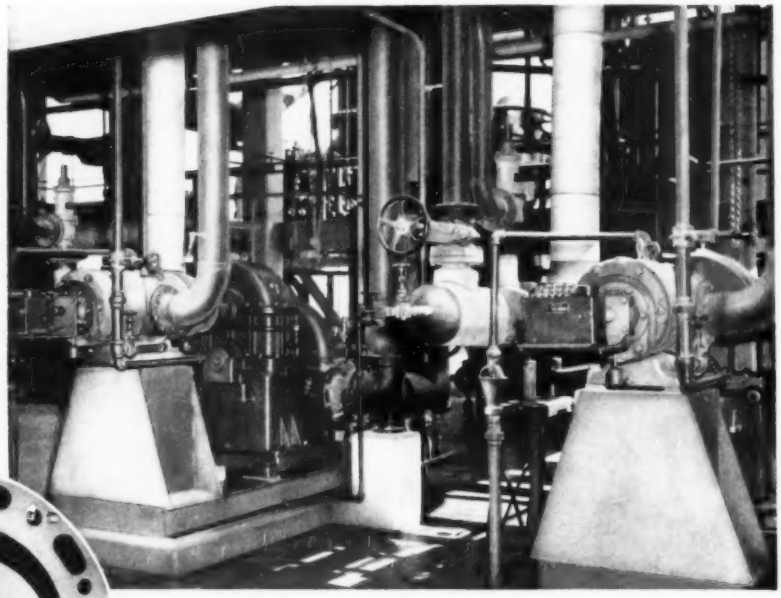

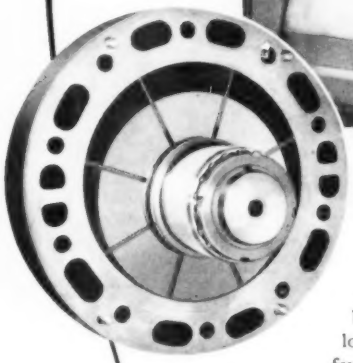

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in size as energy was imparted to them by the wind. At first group velocity of the smaller waves was somewhat less than the storm velocity. However, as they increased in size and in velocity, they ultimately moved out ahead of the storm.

Since these waves had traveled through a long distance before reaching the offshore installations, their period was great and they had the character of swells. Some of these swells running ahead of the storm had a 20-ft. amplitude with an 11-second period when they reached the Ohio-Melben site during midafternoon of October 3. By 9 p.m. the wave height had increased to 27 ft. with a period of 10 seconds. At 10:45 p.m. the height was reduced to 21 ft. with a period of 9.7 seconds.

At the Stanolind site swells running ahead of the storm reached 15 ft. at 4:30 p.m. with a period of 11.2 seconds. The highest waves of 10.6-second period and 26-ft. amplitude occurred around 10:30 p.m. At 12:45 a.m. on October 4 the wave height was reduced to 16 ft. with a 9.9-second period. None of these wave crests would reach the platform height at either location in question.

Although the Stanolind rig lay directly in the path of the maximum winds of the hurricane (see Fig. 1), the wave heights at the Ohio-Melben location were greater than those at the Stanolind position. This may be explained as follows:

A study of the bottom contours and a consideration of refraction effects indicated that deep-water wave crests approaching the Ohio-Melben site from the south and southeast were increased in height. The reverse process occurred in connection with the waves approaching the Stanolind site from the south.

Steep, short-period storm waves from an easterly direction were undoubtedly superimposed upon the longer period swells as the center of the storm approached the areas of interest. However, due to refraction effects, these were considerably reduced in magnitude, with result that a choppy sea occurred but the long-period swell component from the south to south-southeast was the most important feature.

Normal technique used in hindcasting waves is based entirely on the concept of "significant waves" which are the average of the highest one-third of all waves present. Tests have shown that this is the height the average experienced observer records. Since there is a spectrum of wave heights, a few waves will be higher than those indicated by this technique. A recent analysis of Pacific Coast wave records has shown that the highest 10 per cent of the waves present have an average crest which is 1.29 times the average of the highest third.

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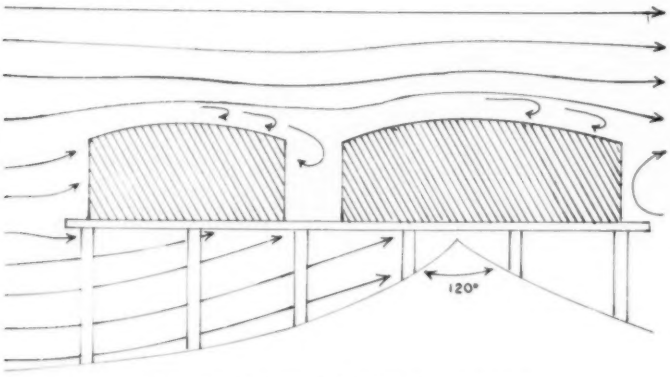

Fig. 2—Wind flow around Ohio-Melben crew quarters.

above by the normal technique were in existence for probably not more than an hour and since their period was about 10 seconds, there were some 360 passing the structure during the hour. Ten per cent of this would be 36 waves which could exceed the maximum values given above by 29 per cent. Thus, at the Ohio-Melben rig one might expect about 36 waves to attain a height of 35 ft. and at the Stanolind rig a similar number to attain a height of 33 ft.

Extent to which the wave crests exceeds the mean water level depends upon the wave steepness and ranges from a half of wave height in the case of very flat waves to three-quarters of wave height in the case of breakers. In order to determine the height of the crest above bottom, it is necessary to consider, in addition, the storm tide. From the reported storm tides along the coast and known facts regarding them it is estimated that a storm tide of some 6 ft. was possible at the Stanolind site and not more than 5 ft. at the Ohio-Melben site.

It appears that the 35-ft. waves at the Ohio-Melben site would have had a crest 24 ft. above the mean water level and at the Stanolind rig the 33-ft. wave would have had a crest 22 ft. above mean water level. Considering the storm tide, the platform at the Ohio-Melben rig (27 ft. above normal mean water level) would be only 22 ft. above the storm mean water level and therefore the crest of the highest 10 per cent of the waves would exceed the platform height by 2 ft. At the Stanolind site the crests would be under the platform height by several feet.

Wave Forces at Ohio-Melben Location

Since it is desirable to estimate the maximum forces which were exerted on the Ohio-Melben structure in order to explain the observed damage, it will be well to deal with the forces due to the highest 10 per cent of the waves at the site. Using the solitary wave theory to obtain particle velocities in accordance with the technique developed by Munk for determining wave forces, the maximum horizontal dynamic pressure on a vertical flat surface perpendicular to the 35-ft. wave crest at the Ohio-Melben site would be 940 lb. per sq. ft. This is at a height of some 2 ft. above the platform base. At this elevation the vertical force on a flat plate would be zero, and at the elevation of the platform, the maximum horizontal force on a flat plate would be 850 lb. per sq. ft. and the vertical force about 85 lb. per sq. ft. For comparison purposes, the horizontal force exerted on circular piles at 27 ft. above normal mean water level would be about 150 lb. per sq. ft.

The maximum vertical force at the platform level would occur just before the crest got there while the maximum horizontal force would be experienced at the very crest. These computations are all based on the steady state solution developed by Munk and do not consider acceleration forces. The acceleration forces are believed to be of about the same order of magnitude as the steady flow forces and about 90° out of phase, **therefore the maximum values given above may be some 40 per cent too low.**

Only the average of the highest 10 per cent of waves were considered in this analysis, it being estimated that some 36 such waves occurred. However, it is possible that a few of these may have exceeded the platform height by as much as 4 to 5 ft. Any of these waves would have broken on the southeast edge of the platform and little if any of the water would flow completely across the top of the platform.

Too little information is available to consider in any detail the magnitude of the forces required in order to produce the observed damage. Therefore nothing can be done at present beyond the presentation of the above figures which indicate what appears to be the worst possible condition which could have occurred in this particular storm on the basis of the computation schemes now available to us. It might be well, however, to point out here that the worst possible conditions which could theoretically occur at this site did not obtain in this particular instance.

Allowing for a maximum possible storm tide of 10 ft. in the stated depth of water, breakers could occur in which the breaker height was 46½ ft. These breakers would extend some 36 ft. above the storm mean water level which in this case would be 60 ft. and therefore would exceed the platform height by 19 ft. Any higher waves than this would break well offshore from the site and little damage would be suffered in the resultant surf. It therefore may be remarked that the platform height was not sufficient to meet the worst possible conditions that could theoretically occur at the site. On the basis of previous studies of wave characteristics in this region it appears that this event may occur about once in 50 years.

Although there exists a possibility that the dense cluster of piles beneath the Ohio-Melben structure could act as a breakwater causing waves to splash upward against the platform, insufficient evidence based upon model tests is available upon which to base an opinion.

Aerodynamic Forces

From photographs of the Ohio-Melben rig prior to the hurricane, it can be seen that the crew quarters consist of two one-story structures, each with a curved roof. From the shape of these roofs it would seem highly probable that aerodynamic forces produced by strong wind flowing past the structure could produce considerable lift, in particular on the curved roofs. The lifting force exerted on any body is:

$$C_L \times \tfrac{1}{2} \rho V^2 S$$

Where C_L is the lift coefficient and depends upon body shape, and $\frac{1}{2} \rho V^2$ is the pressure force due to a wind of velocity V in air of density ρ, and the force acts on an area S. C_L is estimated from known wind-tunnel data. Steady winds of 50 to 60 m.p.h. blowing over a curved surface in the manner shown in Fig. 2 produce a lifting force on the roof alone of 6 to 7 lb. per sq. ft. with the gusts which were probably present doubling the lifting force. (This force increases as the square of the velocity).

(Continued on page 161)

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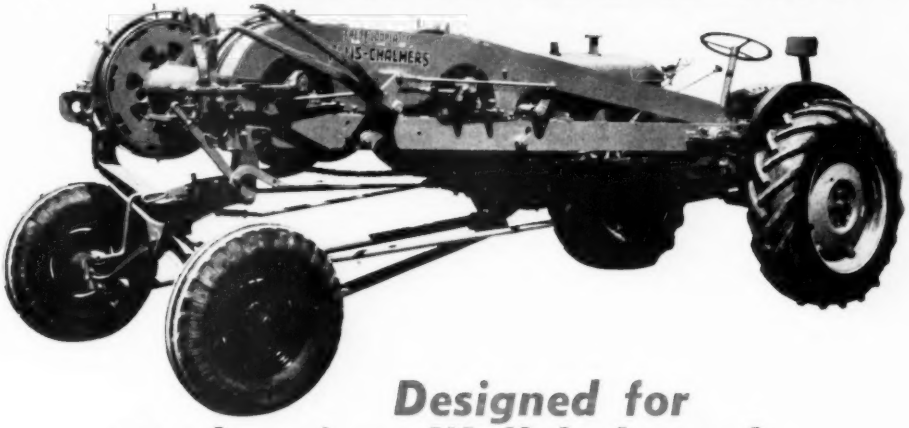

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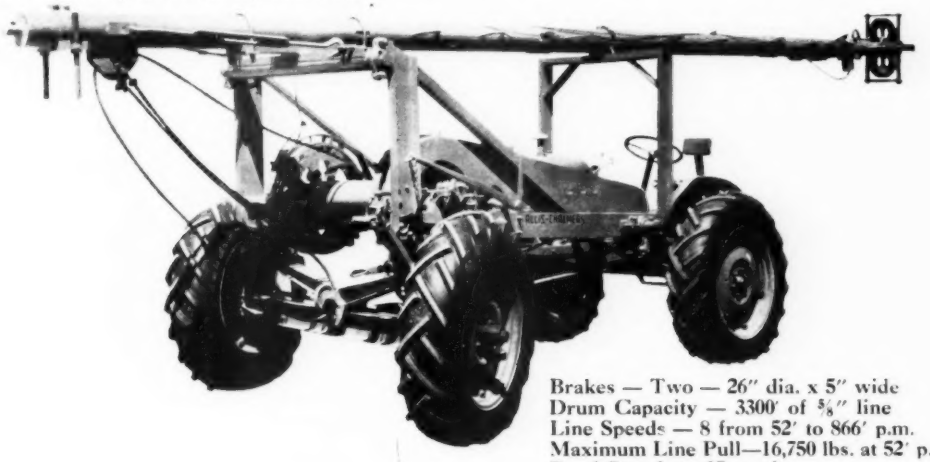

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CASE HISTORY

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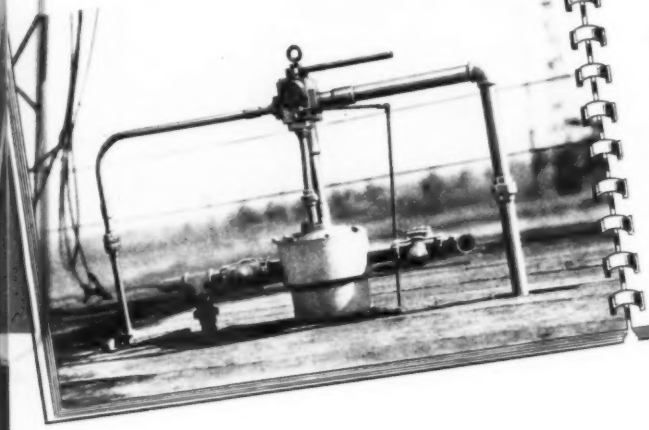
DOMINGUEZ FIELD, CALIFORNIA



CASE HISTORY

Comparative 4-Year Operating Costs of Two Wells on Same Lease

The detailed operating costs kept on two Dominguez wells over a period of four years (see below), dramatically reflect the savings achieved by Free Pumping. As the chart and figures show, the big difference in operating cost of the two wells is in pump pulling. Total 4-year pulling cost for the rod pump well was $871; for the Free Pump well only $37.

BREAKDOWN OF OPERATING COSTS

	Well No. 26 Free Pump (51 months)	Well No. 52 Rod Pump (50 months)	Well No. 52* Free Pump (7 months)
Depth	4710 ft.	4228 ft.	4228 ft.
Pump Repair Cost (cost/bbl.)	.58c	.53c	.00c
Pump Pulling Cost (cost/bbl.)	.05c	1.30c	.00c
Total Cost (cost/bbl.)	.63c	1.83c	.00c

**The second half of the story* is even more surprising. It starts with the conversion of Well 52, with which Well 26 is compared, to Free Pumping. In seven months since the conversion was made, no expense has been incurred for repairs or pump pulling.

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In addition to the wind forces mentioned above there is a lifting component applied from below on the flooring of the platform. The waves encountered at the site were of trochoidal form with crest angles not too far from the critical limit of 120°. Wind blowing over such a crest would be thrust upward toward the platform impinging upon it at an angle of as much as 30° as indicated in Fig. 2.

The lifting force on the structure due to these combined effects might have been sufficient to remove the crews' quarters from the pilings and blow them into the water. In view of the fact, however, that the dynamic pressures resulting from wave action are so much greater and because a few of the waves would have reached the floor of the platform, it is believed that wave action may have been largely responsible for the destruction of this structure.

Conclusion

Analysis of the available data indicates that a few waves definitely broke over the Ohio-Melben platform and affected at least the southeast side of the platform producing a maximum horizontal dynamic pressure on a flat plate of at least 940 lb. per sq. ft. and vertical dynamic pressure of at least 85 lb. per sq. ft. It is believed that these forces were responsible for the major portion of the destruction observed although aerodynamic forces acting on the crews' quarters might also have contributed to the destruction. **The worst possible conditions which could have occurred at the site were not experienced in this storm.** With a maximum storm tide of 10 ft. waves of sufficient height to break would be 46½ ft. in height and their crests would extend 19 ft. above the platform.

The meteorological and oceanographic analyses presented herein were conducted by R. D. Elliott and Paul Horrer under the direction of Dr. Irving P. Krick. Norman MacDonald aided in the collection of data for this study supplementing those obtained through normal channels.

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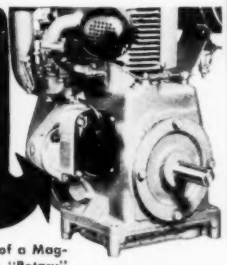

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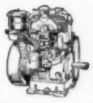

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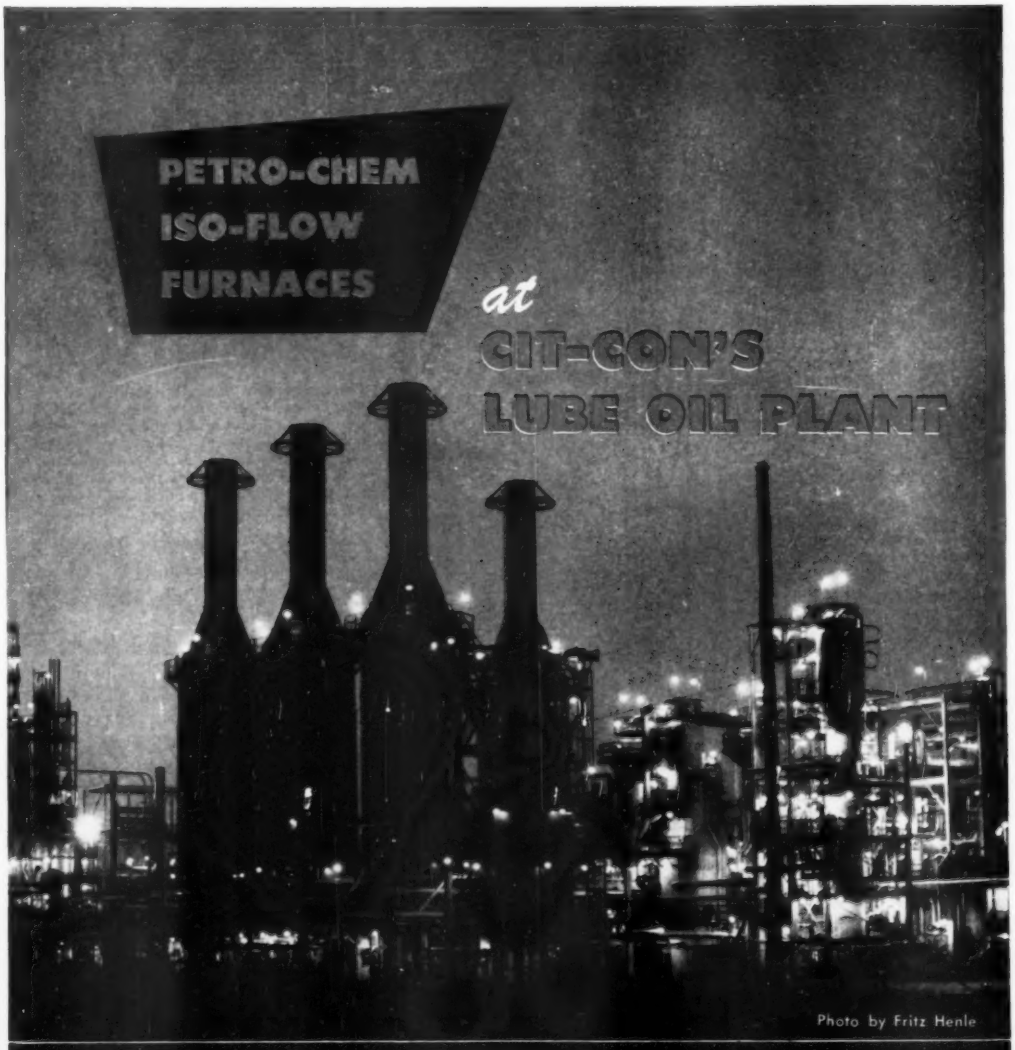

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CHLORINATION of Petroleum Hydrocarbons

by G. W. Hearne

CHLORINATION has become of considerable importance as a means for utilizing the petroleum hydrocarbons. The organic chlorides find numerous applications in industry chiefly as chemical intermediates. Concurrently with the expansion in this field, there has been an improved understanding of the mechanisms followed in the chlorination reactions. The chlorination of the saturated hydrocarbons is explained by a chain mechanism initiated by light, temperature, catalysts, or the simultaneous occurrence of another chlorination reaction. The unsaturated hydrocarbons differ principally in that they react in the liquid phase in the absence of light and catalysts by a polar mechanism which can result in either vicinal dichlorides by addition or allylic chlorides by substitution.

The author is with Shell Development Co., Emeryville, Calif. This paper was presented at the Southwest regional meeting of the American Chemical Society, Oklahoma City.

THE past two decades have seen a marked increase in the preparation of organic chlorides by the chlorination of petroleum hydrocarbons. Today we find large quantities of ethylene dichloride prepared by the chlorination of ethylene, and allyl chloride produced by the high-temperature chlorination of propylene. Amyl chlorides have been prepared for a long time by chlorination of the pentanes and methallyl chloride from isobutylene. Chlorinated paraffin wax was produced in considerable tonnage during the war, but production has declined somewhat since that time. Sulfochlorination of higher-molecular-weight nonaromatic hydrocarbons for detergents is also being practiced.

Constantly, new organic chlorides are being offered in experimental or semicommercial quantities. Among these should be mentioned hexachlorobutadiene and hexachlorocyclopentadiene, hepta and octachloropropane, 2 and 3-chloroallyl chloride, benzyl chloride, and a number of other interesting chlorides. If any of these should find general acceptance, there would be a considerable expansion in the tonnage of chlorides derived from the chlorination of petroleum hydrocarbons.

Looking at the general picture, we also see a large quantity of organic chlorides which are produced from other sources, but which could be produced almost as economically by the chlorination of petroleum hydrocarbons.

Carbon tetrachloride currently produced from carbon bisulfide could also be manufactured from methane either with chlorine or with hydrogen chloride and air.

Methyl chloride derived from methanol could also be produced by methane chlorination.

Ethyl chloride prepared by the hydrochlorination of ethylene has a potential competitor in the chlorination of ethane.

The major chlorides derived from acetylene, namely, vinyl chloride, tri and tetrachloroethylene and chloroprene, could all be made by chlorination of petroleum hydrocarbons.

Acetylene itself may become a petroleum-derived hydrocarbon in time. Likewise benzene, which is the source for chlorobenzene, p-dichlorobenzene and benzene hexachloride or gammexane, may be derived from petroleum. Thus, looking at the over-all picture one cannot help but be optimistic that there will be further expansion in the field of chlorination of petroleum hydrocarbons. The annual production of noncyclic chlorinated hydrocarbons is close to 900,000 tons at the present time.

Uses to which halogenated petroleum hydrocarbons are put would be much too numerous to list in this discussion. This is largely due to their reactivity which makes them suitable for chemical synthesis. It is often true that the organic chlorides themselves are not offered commercially, but are completely converted to derivatives. This makes it easy to underestimate the scale on which the petroleum hydrocarbons are being halogenated. As an illustration, butadiene was prepared by the chlorination of butylene followed by the dehydrochlorination of dichlorobutane. A commercial plant was constructed in 1940 and operated throughout the war years giving considerable assistance to the rubber companies in setting up the synthetic-rubber program. All of the dichlorobutane was converted to butadiene and none was offered commercially.

Allyl Chloride Is Versatile

Perhaps the most versatile of the halogenated petroleum hydrocarbons is allyl chloride. A recent survey in our laboratory showed over 700 literature references where the allyl halides are mentioned.

The reactions of allyl chloride can be divided roughly into those which involve a replacement of the chlorine atom and those which proceed by an attack on the double bond. The allylic chlorides react much more rapidly than the corresponding saturated chlorides in the replacement reactions. The often troublesome intramolecular dehydrochlorination which accompanies the reactions of many saturated chlorides is not observed with allyl chloride.

Hydrolysis of allyl chloride yields allyl alcohol. This can be polymerized to polyallyl alcohol and the allyl esters can be converted to valuable resins.

Allyl alcohol can be hydrogenated

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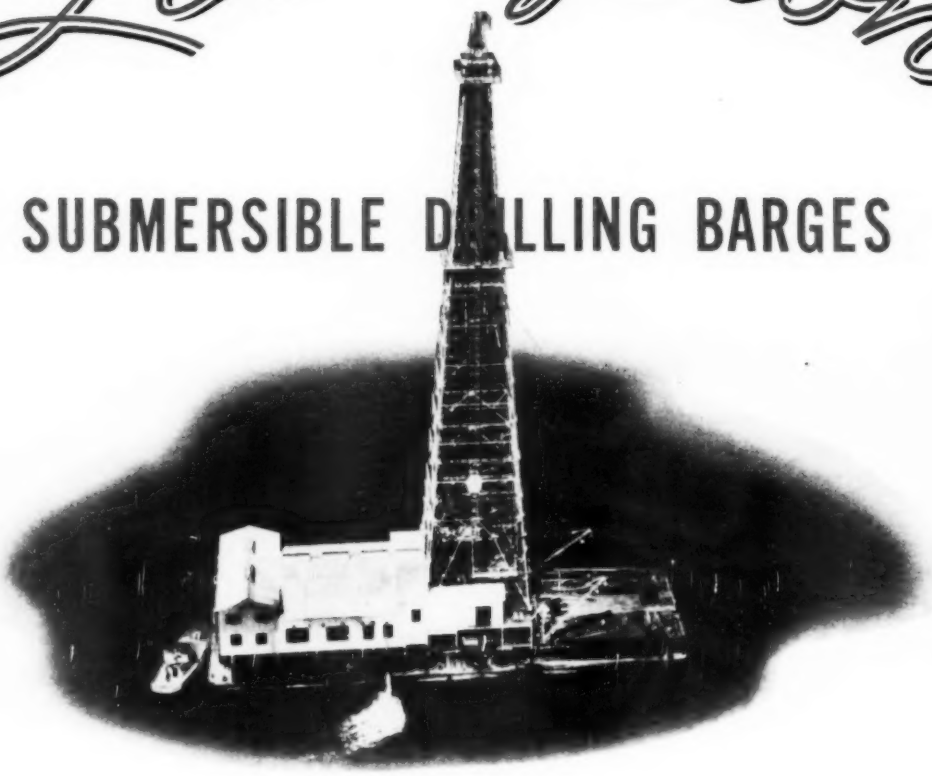

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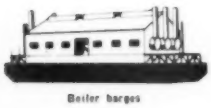

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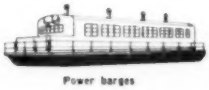

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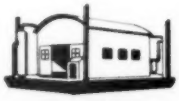

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to n-propyl alcohol, isomerized to propionaldehyde, or oxidized to acrolein. It can be reacted with chlorine and water to form the glycerol monochlorohydrins which in turn can be converted to glycerol or glycidol.

Allyl ethers are formed by reaction of allyl chloride with alcohol and alkali; allylamine is produced by ammonolysis and can be oxidized to acrylonitrile. By reaction with the necessary metal salt, allyl bromide, iodide, sulfide, thiocyanate, mercaptan and other derivatives can be prepared.

The reaction of chlorine and water with allyl chloride forms the glycerol dichlorohydrins. These can be converted to epichlorohydrin or hydrolyzed to glycerol. Chlorination at low temperatures yields 1,2,3-trichloropropane. High-temperature chlorination introduces another chlorine atom into the molecule without loss of the allylic structure. These allylic polychlorides are of value in the control of nematodes. The addition of hydrogen chloride proceeds slowly to form a vicinal dichloride. Addition of hydrogen bromide in the presence of light or peroxides forms 1-chloro-3-bromopropane, a good starting material for the synthesis of cyclopropane.

Underlying Mechanisms

Increasing research on the chlorination of hydrocarbons has contributed greatly to an understanding of the mechanisms underlying these reactions. This is of considerable importance in predicting the behavior of new hydrocarbons and improving existing processes. Considering first the saturated hydrocarbons, the reaction requires initiation by light, catalysts, temperature, or the simultaneous occurrence of another chlorination reaction. The reactions at low temperature are greatly retarded by the presence of oxygen. They are believed to follow a chain mechanism based on chlorine atoms.

$$Cl_2 \longrightarrow 2Cl$$

$$Cl + CH_4 \longrightarrow HCl + CH_3—$$

$$CH_3— + Cl \longrightarrow CH_3Cl + Cl$$

$$CH_3— + O_2 \longrightarrow CH_3O_2— \longrightarrow (?)$$

$$CH_3— + SO_2 \longrightarrow CH_3SO_2—$$

$$CH_3SO_2— + Cl_2 \longrightarrow CH_3SO_2Cl + Cl$$

Since the organic chlorides which are produced can also react with chlorine, a high ratio of hydrocarbon to chlorine is required for the best yields of monochlorides and the reaction is best conducted in a homogeneous gas or liquid phase. For preparing highly chlorinated products an excess of chlorine is employed. Equimolar quantities may react uncontrollably. A heterogeneous system such as a gas-liquid or gas-solid catalyst combination frequently leads to a greater proportion of more highly chlorinated products due to preferential reaction either in the liquid phase or on the catalytic surfaces where the concentration of chlorinated products is relatively high.

Methane is considerably less reactive than the higher homologs. The reactivity of the normal hydrocarbons appears to increase with increasing length of the carbon chain. At moderate temperatures (photochemical chlorination), the hydrogen atoms bound to tertiary carbon are replaced most readily, followed by the secondary, while primary carbon to hydrogen bonds are most stable. At elevated temperatures (500°-600° C.), all carbon-to-hydrogen bonds approach a similar reactivity but the differences observed at lower temperatures still persist to a certain extent.

The presence of a chlorine atom in the hydrocarbon causes a decrease in reactivity which is most marked for the bonds of hydrogen to the carbon atom adjacent to the one containing the chlorine. For example, in the vapor-phase chlorination of ethane, ethyl chloride is only one-fourth as reactive as ethane. The principal dichloride is 1,1-dichloroethane with only traces of 1,2-dichloroethane.

Unsaturated hydrocarbons are formed to a certain extent, particularly at high temperature. In some cases this is caused by an uncatalyzed loss of hydrogen chloride from the chlorination products. However, the thermal dehydrochlorination of some

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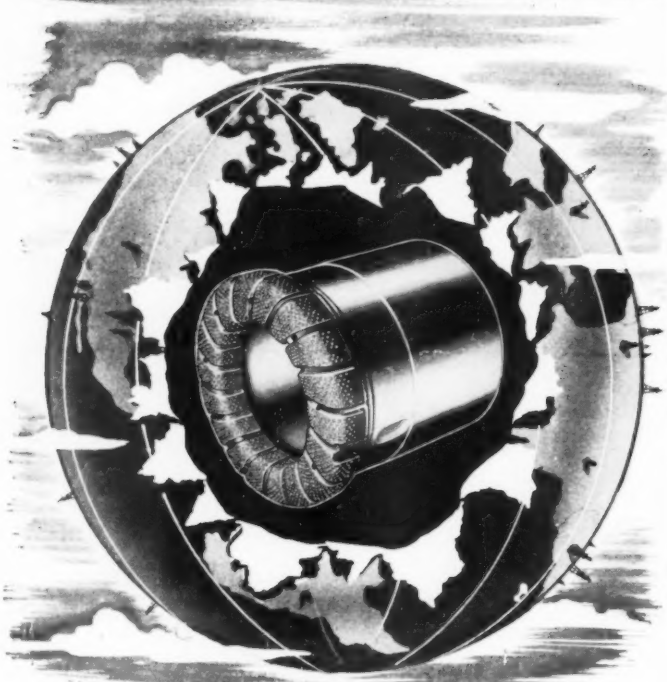

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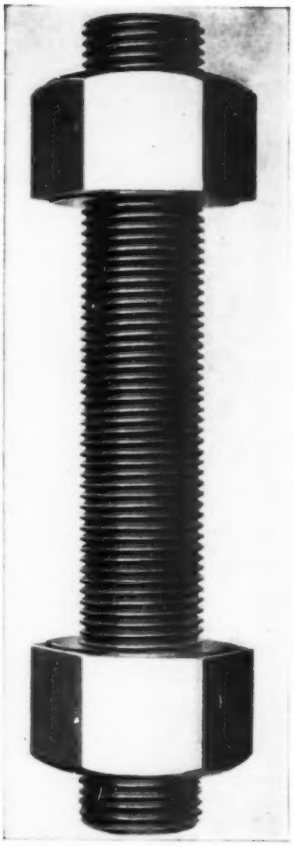

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organic chlorides such as ethylene dichloride has been shown to be catalyzed by traces of chlorine which no doubt induce decomposition by a chain mechanism:

$$Cl + CH_2Cl{\cdot}CH_2Cl \rightarrow HCl + CHCl{\cdot}CH_2Cl$$

$$CHCl{\cdot}CH_2Cl \longrightarrow CHCl{=}CH_2 + Cl$$

Chlorination at elevated temperatures with excess chlorine frequently leads to the formation of lower-molecular-weight polychlorides by chlorinolysis. Among the interesting reactions by chlorinolysis are the formation of hexachlorobutadiene from polychlorobutanes and hexachlorocyclopentadiene from the polychloropentanes.

The unsaturated hydrocarbons differ from the saturated most notably in that they react at low temperatures in the liquid phase in the absence of light and catalysts and that the reaction is not stopped by oxygen. The influence of the presence of a liquid phase was shown by contacting the pure lower olefins and chlorine in a clean Pyrex glass reactor arranged so that the temperature at no point was below 150° C. No reaction took place in the absence of light. When the temperature was gradually lowered, the reaction suddenly started and became almost complete at a point where the liquid film condensed on the reactor wall. On raising the temperature the reaction could be carried out under conditions which were not possible initially because the walls had become contaminated with the liquid chlorination product.

The reaction which takes place in the liquid phase can also be conducted in the vapor phase over solid catalytic surfaces. Thus the ethylene from an ethane-ethylene mixture can be almost completely reacted while the ethane is unaffected by passing the mixture in the vapor phase over a catalyst such as calcium chloride.

This reaction which is not inhibited by oxygen is believed to involve a polarization of the halogen and the unsaturated hydrocarbon. The first step is postulated as a reaction between the positive chloride ion and the double bond to form a three-membered ring.

$$RCH{=}CH_2 + Cl^+ \rightarrow RCH(Cl^+){-}CH_2$$

Reaction may then be completed by an attack by the negative chloride ion. This occurs on the back face of one of the carbon atoms to which the positive chlorine is attached with the result that the dichloride contains its halogens in transrelationship toward each other. This is established from the alicyclic olefins where rotation about the carbon-to-carbon bond is rectricted and only the trans-dichloride is found.

The branched-chain olefins and some vinyl-type chlorides form allylic chlorides on chlorination at low temperatures in the liquid phase. This has been shown by experiments on 2-chloro-2-butene to involve a shift in the position of the double bond, here with the formation of 2,3-dichloro-1-butene. Thus the behavior of isobutylene and its homologs is quite similar to that of the straight-chain olefins in the initial stage of the chlorination. However, instead of adding a negative chloride ion, the positively charged complex loses a proton to form hydrogen chloride and an allylic chloride.

$$CH_2{=}C(CH_3){\cdot}CH_3 \xrightarrow{+Cl^-} CH_2{-}C(Cl^+)(CH_3){-}CH_3 \xrightarrow{+Cl^-} CH_2Cl{-}C(CH_3){=}CH_2 + HCl$$

The proton is eliminated more readily from a primary carbon atom

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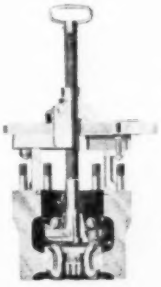

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than from a secondary or tertiary carbon atom.

$$CH_2{=}C(CH_3){-}CH_2{\cdot}CH_3 \xrightarrow{+Cl_2} CH_2{=}C(CH_2Cl){-}CH_2{\cdot}CH_3 + HCl$$

The ratio between substitution and addition varies considerably with the structure of the branched-chain olefin or vinylic chloride due to factors which either impede the entrance of the negative chloride ion or accelerate the expulsion of the proton. Possibly hyperconjugation is involved.

There is a great difference in the reactivity of the various unsaturated hydrocarbons with chlorine in the liquid phase. This is much more marked than the differences in reactivity of the saturated hydrocarbons and frequently makes it possible selectively to chlorinate one component of an olefin mixture while the others pass through virtually unchanged. There is a progressive increase in the rate of chlorination as the ethylenic hydrogen atoms are replaced by alkyl groups. Thus, propylene chlorinates much faster than ethylene. 2-Butene chlorinates at the same rate as isobutylene in spite of the marked difference in the nature of the product. Both of these are chlorinated more rapidly than 1-butene. 2-Methyl-2-butene in which three ethylenic hydrogen atoms are replaced by methyl groups chlorinates faster than any pentene.

The presence of a chlorine atom in the molecule in close proximity to the double bond has a marked retarding action on the rate of chlorination in the liquid phase. Thus, methallyl chloride chlorinates much more slowly than isobutylene. This is of considerable assistance in preparing unsaturated monochlorides since a large excess of the starting unsaturated hydrocarbon is not required.

The energy liberated from the chlorination by an ionic mechanism is capable of initiating reaction chains. Thus, butane can be chlorinated at about room temperature in the absence of light when it contains a few per cent of butene. The liquid phase chlorination of ethylene leads to the formation of considerable tri and polychlorides by substitution of chlorine into 1,2-dichloroethane which would normally be unreactive in the absence of the unsaturated hydrocarbon. All of these induced substitution reactions are markedly decreased by the presence of oxygen.

The unsaturated hydrocarbons also add chlorine by a chain mechanism. This is shown by a reaction at moderate temperature in the vapor phase initiated by light and inhibited by oxygen.

$$Cl_2 \rightarrow 2Cl$$

$$Cl + CH_2{=}CH_2 \rightarrow CH_2Cl{\cdot}CH_2{-}$$

$$CH_2Cl{\cdot}CH_2{-} + Cl_2 \rightarrow CH_2Cl{\cdot}CH_2Cl + Cl$$

The chain addition no doubt takes place also in the presence of a liquid phase when oxygen is not present, but it is often difficult to detect because the ionic chlorination takes place more rapidly. However, it could be observed in the liquid phase chlorination of 2-chloro-2-butene which proceeds rather slowly and the predominant ionic reaction is substitution. Light and peroxide catalysts markedly increased the proportion of chlorine reacting by addition.

Behavior at High Temperatures

In recent years the behavior of the unsaturated hydrocarbons on chlorination at elevated temperatures has been studied in considerable detail stimulated by the demand for allyl chloride as a chemical intermediate. The unsaturated hydrocarbons differ from the saturated in that the chlorination is much more specific. This is the result of the enhanced reactivity of the allylic hydrogen atoms and the diminished reactivity of the vinylic hydrogens. Thus, the monochloride fraction from the high temperature chlorination of propylene consists of 96 per cent allyl chloride, 3 per cent 2-chloropropene, and 1 per cent of 1-chloro-1-propene.

An example which might appear contradictory is the high-temperature chlorination of allyl chloride which forms approximately 90 per cent 1,3-dichloropropene and 10 per cent of 3,3-dichloro-1-propene. It was thought at first that the principal product from allyl chloride was the 3,3-dichloro-1-propene and that this isomerized to 1,3-dichloropropene. However, the situation has been greatly clarified by study of the behavior of 1-chloro-1-propene on high-temperature chlorination. This forms the same products in the same proportions as allyl chloride. The formation of 3,3-dichloro-1-propene from 1-chloro-1-propene via isomerization of 1,3-dichloropropene is untenable since this does not take place under conditions normally employed for allylic rearrangements. A more plausible explanation involves reaction by a chain mechanism.

Thus the high-temperature chlorination of the straight-chain olefins does not, strictly speaking, involve the replacement of an allylic hydrogen atom by a chlorine atom. An allylic hydrogen atom is removed, but because of the mobility of the resultant radical, chlorine may enter at a different position from that occupied by the original hydrogen atom. This could not be detected when the allylic radical is symmetrical as in the case of propylene, 2-chloropropene and 1,3-dichloropropene which form allyl chloride, 2,3-dichloro-1-propene, and 1,3,3-trichloro-1-propene respectively. However, the chlorination of 2,3-dichloro-1-propene forms a small amount of 2,3,3-trichloro-1-propene together with the principal product 1,2,3-trichloropropene as would be expected.

The synthetic-rubber program has made readily available certain of the simpler petroleum diolefins such as butadiene, isoprene, methylpentadiene, and cyclopentadiene. The role played by halogenation in this development has been briefly mentioned. These diolefins are well suited for exploitation by halogenation and no doubt considerable work along these lines is in progress at the present time.

The chlorination of butadiene, which in our experience is best conducted in the vapor phase over catalytic surfaces, forms a mixture of 3,4-dichloro-1-butene and 1,4-dichloro-2-butene. These can be isomerized so that either can be made the principal product. The former can be converted to chloroprene in high yield by treatment with alkali. 1,4-Dichloro-2-butene contains two reactive primary allylic chlorine atoms and is a promising source for bifunctional derivatives. Among these might be mentioned reaction with sodium cyanide to form 1,4-dicyano-2-butene, which can be hydrogenated to the nylon intermediate, hexamethylene diamine. This is possibly the process followed in the recently announced plant to prepare a nylon intermediate from butadiene.

Recent patents state that both 3,4-dichloro-1-butene and 1,4-dichloro-2-butene can be converted to the α-ω dicyanide by reaction with sodium cyanide in acetonitrile solution in the presence of cuprous chloride.

$$Cl + CH_2{=}CH{\cdot}CH_2Cl \longrightarrow HCl + \underset{90\%}{CH_2{=}CH{\cdot}CHCl} + \underset{10\%}{CHCl{=}CH{\cdot}CH_2}$$

$$Cl + CHCl{=}CH{\cdot}CH_3 \longrightarrow HCl + CHCl{=}CH{\cdot}CH_2$$

$$CH_2{=}CH{\cdot}CHCl + Cl_2 \longrightarrow CH_2{=}CH{\cdot}CHCl_2 + Cl$$

$$CHCl{=}CH{\cdot}CH_3 + Cl_2 \longrightarrow CHCl{=}CH{\cdot}CH_2Cl + Cl$$

A practical approach to the problem of

COOLING-WATER SLIME

by R. B. Wise*

THE chemistry of cooling-water treatment is straightforward, even though some of the theories may take a little study for their understanding. Microbiology is different.

Microbiology deals with growing plants and animals. Their behavior is not like the well-defined behavior of calcium carbonate. It is not possible at present to compose a book of rules on microbiological growth and its control in recirculating cooling-water systems. It is possible to classify the various organisms from the standpoint of cooling-water systems rather than from the theoretical bacteriology standpoint. It is also possible with this classification to list specific troublesome organisms.

Three Groups of Organisms

The three main groups of organisms which may give trouble in recirculating cooling-water systems are algae, bacteria, and fungi. The mere presence of "bugs" in the water is not trouble; trouble is caused only by the portion that tend to clump together and form slimy deposits. Somewhat contrary to common belief, algae are usually the least troublesome of the three groups in modern recirculating cooling systems. The following discussion gives the subdivisions of each of these three main groups, describes the occurrence and action of each subdivision, and lists the trouble-making organisms.

1. **Algae.**—Fig. 1 shows the breakdown into types of algae. The blue-green and green algae are primarily troublesome in restricting the flow of water (and air in some cases) in the cooling tower. They flourish only in portions of the system exposed to light and air. On casual observation, nearly all of the different organisms in the green and blue-green algae classification have a greenish color.

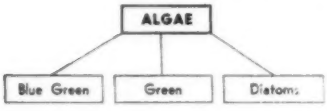

Fig. 1

There are particular species of organisms in both the green and blue-green classifications, but the behavior of the different species is so similar from the standpoint of growth and killing in circulating cooling systems that it is not considered necessary to list any particular trouble makers in these two groups. Killing treatment may be slightly different for the green and blue-green, and it is for this reason they should be separated in this manner on the analysis.

Diatoms are composed largely of silica and a deposit of diatoms on chemical analysis might look like a mineral deposit. These organisms are found in natural water supplies and may form deposits in piping, filters, or similar equipment. Here again the specific species of organisms is relatively unimportant since the behavior of all common species is quite similar from the standpoint of growth and killing in a cooling-water system.

2. **Bacteria.**—Certain types of bacteria are responsible for a great deal

*National Aluminate Corp., Chicago.

Bill Jones Tries to Find the Answers

BILL JONES has charge of the cooling water treatment in a refinery. In the course of an inspection of heat-exchange equipment, Bill finds that there is no true scale in evidence and practically no corrosion. However, the

tube sheets of the exchangers are so fouled with a slimy substance that it has completely blocked a number of the tube ends.

Bill has read all the current technical literature on prevention of scale and corrosion and feels quite capable on this subject. This slime," though, is something new. Bill says, "It must be algae."

He carefully takes a sample of the water and sends it over to a friend of his who is a good bacteriologist with the question, "What kind of bugs are in this water?" His friend replies in about 10 days saying that the water contained a total bacteria count of 400,000 **E. Coli** being negative, the predominant organisms being **Serratia marcescens** and **Micrococcus luteus.** No green or blue-green algae are found although there are some **Navicula** and a count of 100 **Penicillium.** Also **Sporovibrio desulfuricans** are present with a count of 10.

Bill's first reaction is, "So what?" A few minutes later he picks up the report and goes to the library, determined to find out what it all means. He finds a big thick book on bacteriology and looks up **Serratia marcescens,** because that was one of the "predominant organisms."

His search shows that this organism is frequently responsible for what they call red bread. Red bread undoubtedly could be very troublesome to bakers, but Bill can see no connection with cooling water. He also learns how this particular bug is identified and a few facts concerning its propagation.

He finally puts the big thick book back on the shelf, goes into his boss' office and says, "I think we ought to change over to city

water so that we won't have to worry about that slime we found on the exchangers."

This story illustrates a common problem.

What else could Bill do about his slime? If practical knowledge of the subject had been available, the chances are he could have solved the problem directly at much less cost than "to change over to city water."

Bill needed to know which bugs were causing the trouble and what to do about them.

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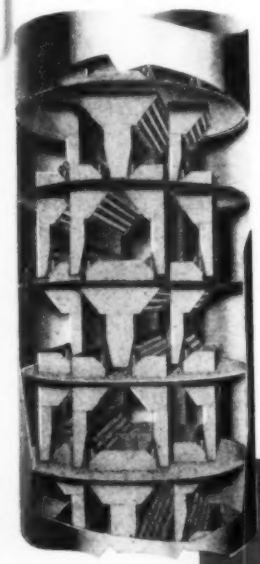

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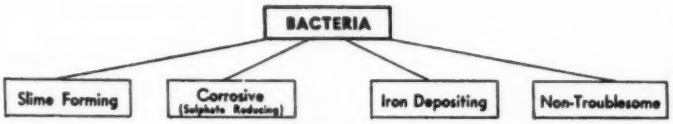

Fig. 2

of the slime found in piping and exchangers of a cooling system. The bacteriologist classifies bacteria primarily as spore-bearing and nonspore-bearing bacteria.

For practical considerations, the classification system shown in Fig. 2 has more direct application to cooling water work. The "slime forming" group includes more commonly encountered slime-forming bacteria. A list of these slime-forming bacteria is shown in Table 1.

TABLE 1—NAMES OF COMMON SLIME-FORMING BACTERIA

Escherichia coli
Aerobacter aerogenes
Aerobacter cloacae
Flavobacterium (species)
Bacillus megatherium
Bacillus subtilis
Bacillus pumilus
Bacillus cereus
Achromobacter (species)

Recognition of the fact that not all bacteria are slime forming is a very important step in interpreting analytical results. The list will enable the bacteriologist to pick out the common troublesome types of bacteria from a slime standpoint in making an examination of a water or a deposit. The relative numbers of these particular organisms present indicate very roughly the degree of trouble caused by them.

The "corrosive" group includes sulfate-reducing bacteria, which, as their name implies, reduce sulfate in the water to sulfide. The bacteriologist calls this bacteria **Sporovibrio desulfuricans.** The sulfide ion is extremely corrosive in a water system, and thus by indirect action the bacteria which produce sulfide ions are also very corrosive.

The "iron depositing" group includes the various iron bacteria which when present are responsible for hydrous iron oxide deposits in cooling-system piping. These bacteria take in solution iron and give off insoluble iron in the form of a slimy sheath around their cells. The resulting deposit is actually composed of iron oxide skeletons of dead bacteria. The most common of these iron bacteria are **Crenothrix, Gallionella,** and **Leptothrix.** Usually these bacteria are found only in well supplies. These organisms utilize the energy from the oxidation of iron compounds in their life processes. **Crenothrix** and **Leptothrix** may also deposit manganese. The iron bacteria are troublesome because of the deposits of slimy iron oxide which they cause in the piping.

The great majority of the bacteria which can be found in a cooling-system water sample are not directly troublesome. For years too much significance has been placed on the "total bacteria count." In itself, this total has no significance, except to show that conditions are favorable for growth of any bacteria if the total count is high. The counts of the organisms known to be troublesome are of much greater importance.

Bacteria which do not tend to clump or to cause chemical reactions in the water are completely harmless to the efficient operation of the water system. For this reason, the author has included a fourth classification "nontroublesome bacteria." The count of nontroublesome bacteria is calculated by subtracting the count of the known trouble makers from the total bacteria count. Undoubtedly all of the troublesome bacteria have not been identified and some

(Continued on page 177)

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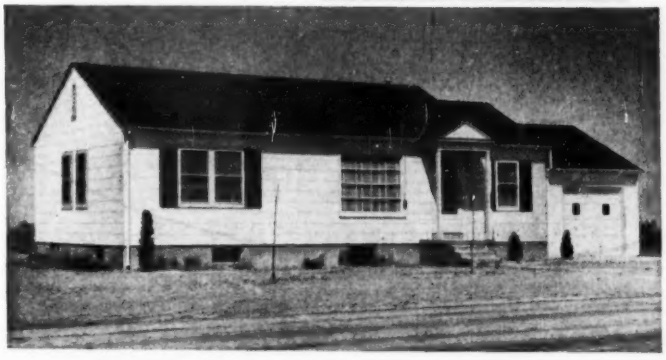

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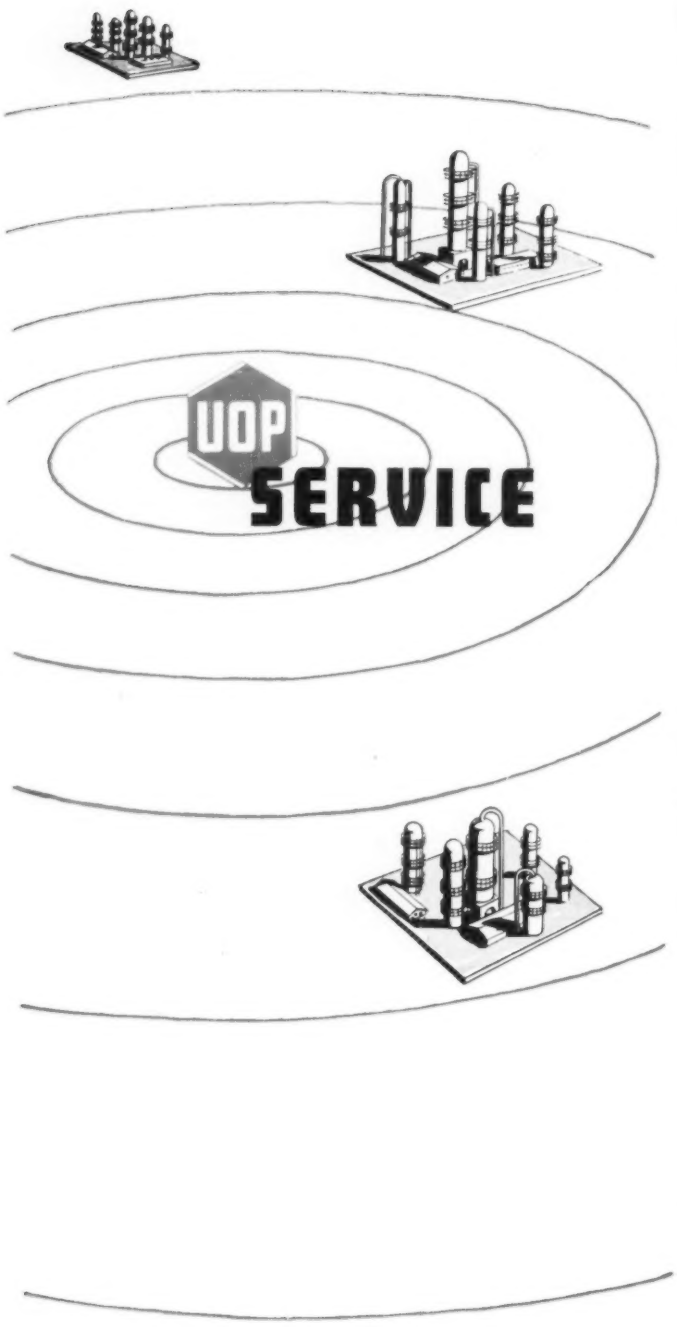

Globe Boosts Capacity With Fluid Cat Cracker

By G. G. Woodruff
Secretary, Globe Oil & Refining Co.

By replacing a thermal cracking plant with the most modern type of fluid catalytic cracking unit and a gas concentration system, a major step has been taken in expanding the motor fuel producing capacity of our refinery at Lemont, Illinois, and substantially improving the octane rating of our gasoline.

G. G. Woodruff

The flexibility of the cat cracker also enables us to increase the yield of other light products, notably domestic furnace oil and diesel fuel, for which there is a growing demand. Production of heavy fuel oil, which is less desirable, has been reduced. With these improvements our refinery is in position to meet not only present octane requirements, but those anticipated in the forseeable future.

Unit Designed by Universal

When the installation of catalytic cracking facilities was first under consideration, all available processes were investigated from the standpoints of construction cost, yield and quality of gasoline and other products to be obtained. After thorough study, the design and engineering of the new facilities were entrusted to Universal Oil Products Company. The new unit, with a design capacity of 6,000 b/d, was placed on stream in early January.

Our Overall Operation

About 9,000 b/d of a mixture of West Texas, Wyoming and Gulf Coast crudes are charged to a combination atmospheric and vacuum distillation unit which produces about 2,800 b/d of gas oil. Approximately 22,000 barrels of a mixture of Illinois, Kansas and Gulf Coast sweet crudes are charged to a combination topping and gas oil cracking unit which produces about 3,200 barrels of a mixture of straight-run and cracked gas oils. The two gas oil streams, amounting to 6,000 barrels, are cracked in the new unit.

The overall refinery operation, including topping, cat cracking, desulfurization, thermal reforming and catalytic polymerization, produces about 17,800 b/d of gasoline or approximately 1,000 barrels more than was produced prior to the installation of the cat cracker. About 7,000 barrels of this gasoline are brought to Ethyl grade with 0.6cc of lead as compared to 1.8cc which we formerly used, while 10,800 barrels are marketed as housebrand gasoline with the addition of 1.1cc of lead. Other pro-

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ducts are kerosene, diesel fuel, tractor fuel, furnace oil, heavy fuel oil, asphalt and road oil.

Here is a comparison of the yield from our old thermal unit and that which we expect from the fluid unit:

	Thermal Cracking		Catalytic Cracking (50% Conversion)	
	Bbl.	%	Bbl.	%
Gasoline (C_4 to 400°F)	1680	27.9	2860	47.8
Light fuel	1020	17.0	1800	30.0
Heavy fuel	3220	53.6	1200	20.0
Gas (Fuel oil equiv.)	186	3.1	440	7.3

The cat cracker is of the general UOP design with the reactor supported by a skirt set on the regenerator and with the stripper hung from the side of the reactor. The new graphic type control board, developed by UOP will be installed.

Low cost and reliable electric power is available to Globe, hence motor drives are used for the air blower and the gas compressors, as well as for most of the pumps. This results not only in lowered utility costs but also in a decrease in capital cost and maintenance.

Steam is used by the process for stripping catalyst and side cuts. This is exhaust from the main column bottoms circulating pump—the only turbine driven pump on the unit. A small amount of reboiler steam is also used for a few small reciprocating pumps and for a small reboiler in the gas recovery unit.

The Gas Concentration System

Steam is generated from waste heat in the regenerator flue gas and the column bottoms. After furnishing steam to the catalytic cracking and gas recovery units, about 10,000 lb./hr. is supplied the refinery for use in crude and vacuum units. The gas concentration system is of the deethanizer type. Its two functions are the preparation of feed for the catalytic polymerization unit and the debutanization of catalytically cracked gasoline; hence, it is designed for maximum recovery of propane.

The system consists of a compressor section, a deethanizer and a debutanizer. Two existing towers were adapted to the deethanizer service.

In operation, the gas from the catalytic cracker receiver is compressed in two stages to 200 lb. per square inch and is charged to an absorption type deethanizer. The overhead from this tower is ethane and lighter gas which is discharged to the fuel gas line. The bottoms are charged to the debutanizer which operated at 150 lb. pressure. The debutanizer overhead is composed of C_3-C_4 fractions, which constitute the charge to the poly unit. The bottoms normally are debutanized gasoline. The unit is designed for very high heat efficiency, reboiler requirements being supplied almost entirely by heat exchange from a cat cracker side-cut and debutanizer bottoms.

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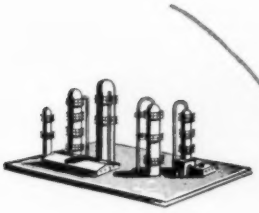

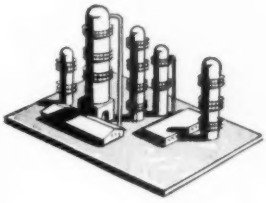

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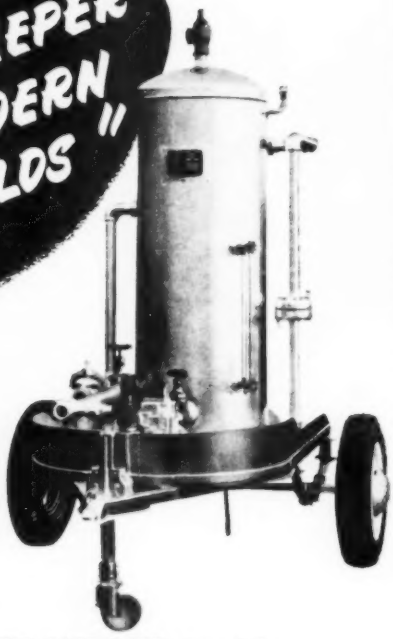

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of these unidentified trouble makers are necessarily included in this group. Even in a true slime formation, it is possible that more than 50 per cent of the total bacteria are not slime forming, but grow in that location merely because growth conditions are good or they are entrapped by the slime growths.

3. **Fungi.**—Fig. 3 shows that the two classes of fungi causing trouble

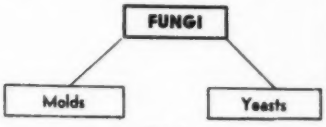

Fig. 3

in cooling-water systems are the molds and the yeasts or yeastlike types of organisms. This identification is important since a single mold organism is extremely large and extremely resistant to killing with normal chemical treatment. The relative sizes of a single mold organism and a single bacteria organism are somewhat the same as a 6-ft. fishing rod compared with a cigarette. In addition, the fishing rod (mold) would probably not be straight and would tangle very easily with other organisms. Both molds and yeasts may result from air-borne contamination of the cooling water.

The bacteriologists have found the more common troublesome mold organisms to be **Aspergillus, Cephalosporium, Paecilomyces, Penicillium,** and **Trichoderma.**

The more common trouble makers among the yeast and yeastlike types are **Torula, Oidium** and **Monilia.**

The general class name of "fungi" also of course includes such things as mushrooms, toadstools, etc. We are concerned in this discussion only with the microorganisms in the fungi classification.

Interpretation of Microbiological Analyses

When a microbiological analysis is reported in the form suggested in the discussion above, the analysis takes on by itself considerably more meaning than a regular analysis report. Very important in the interpretation of the analysis is the source of the sample. Our friend Bill in the introductory box of this article had an excellent opportunity to obtain samples of the slime itself for analysis and examination. Instead, he obtained a sample of the water. Wherever it is possible to do so, several samples of slime from different points of the system accompanied by a water sample should be submitted for microbiological analysis. Like some occurrences of mineral deposits, slimes may vary widely in composition from one point to another in the system.

The identification of organisms in a slime sample actually shows what

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groups are causing the deposit or growth. For example, if the slime is analyzed and found to contain no algae, no fungi, but large quantities of bacteria, then the application of a bactericide is clearly required. If the group identified had been largely fungi then a fungicide should be applied. The microbiological examination of the water from the system is not always useful, but sometimes serves to show organisms which may not have been present in the particular slime sample submitted for analysis, but which may be causing trouble in another part of the system.

The quality of the makeup water should be known. If the makeup water is relatively sterile with respect to microorganisms, the recirculating cooling water should be quite similar to reflect good microbiological control (see Table 2).

On the other hand, if the makeup water is badly contaminated, it is quite normal to find rather high numbers of bacteria and sometimes fungi organisms present in the recirculating cooling water even though microbiological control conditions are good and no slime troubles are being experienced. Any system using a badly contaminated water as a makeup source is vulnerable to slime troubles. In such case, there is continuous inoculation of the system with fresh organisms to start new growths, so that killing all organisms in the system periodically may not prevent slime growths.

TABLE 2—WATER FROM SYSTEM (RELATIVELY STERILE MAKEUP)

What the analysis report shows and what it means
Sulfate-reducing bacteria (any number)—If equipment and piping has shown any evidence of corrosion, the sulfate-reducing bacteria have been a factor in this corrosion.
Slime-forming bacteria (more than 10,000)—Probable presence of slime deposits and need for better microbiological growth control.
Mold or yeast (any number)—Rarely found in the water stream. Their presence in the water usually reflects flourishing growth conditions or severe contamination by air.
Diatoms (any number)—Indicates need for better microbio growth control.
Green or blue-green algae—Usually merely a reflection of algae growths on the tower or other exposed portions of the system. Need for control should be based primarily on actual algae deposits.
Iron bacteria—Accounts for any iron oxide deposits and shows need for increased microbio growth control.
Nontroublesome bacteria (more than 500,000)—Shows that conditions in the system are favorable to the growth of bacteria. Therefore given an opportunity slime formers would flourish.

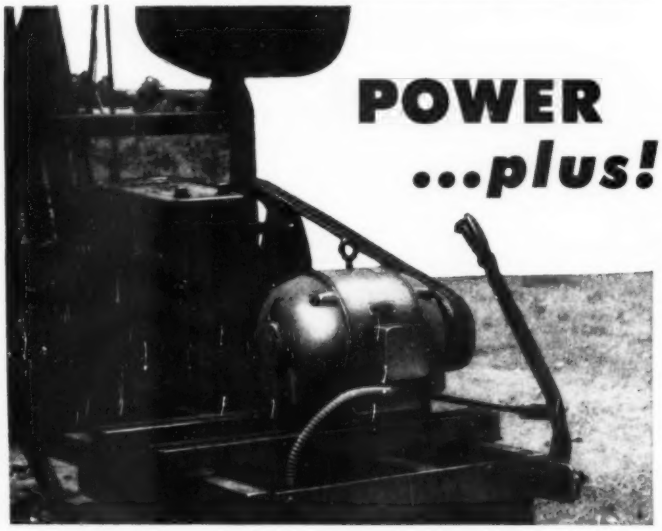
The identification of particular groups of organisms is essential to specialists in the water-treating chemical field in prescribing the proper type of slimicide or bactericide for greatest effectiveness.

Application of Chemicals to Control Slime

After obtaining the story on slime conditions in cooling water by intelligent study of laboratory findings, the next step is selection of proper chemicals to kill the trouble-making growth. Selection of proper chemicals involves not only the identification of specific types present, but also the different combinations present in the growth.

Other additional factors guide the final selection of the chemical best suited to the job. These factors include operating characteristics of the system, size of the system, feeding equipment available or cost of feeding equipment, dosage requirements, possible hazards in application of the chemical, and our friend Mr. Economics. Proper analysis of all these factors should be attempted only by water-treatment specialists, since an individual decision should be made for each problem. At present, the subject matter cannot be sufficiently generalized to provide simple rules enabling the plant operator to make this selection himself.

Selection of proper chemical treatment demands a considerable background of experience in interpreting the evidence of the bacteriologist. It is possible for a plant operator to build for himself this background of experience enabling him to select proper treatment for his own plant by intelligent application of the principles expressed in the above discussion.



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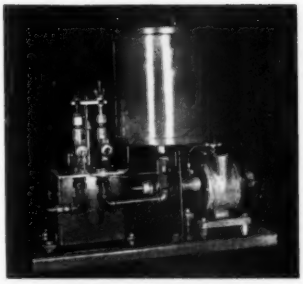

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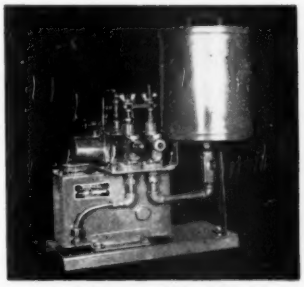

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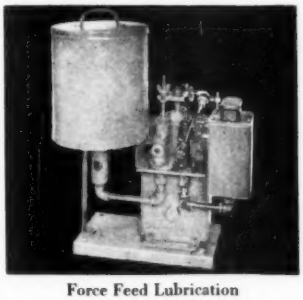

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BENDER LEAD SULFIDE TREATING PROCESS

by Ira T. Fritz*

IN kerosine-sweetening operations, the treating system developed at Sinclair Refining Co.'s Marcus Hook plant about 10 years ago has proved particularly efficient. During this period millions of barrels of kerosine have been treated at extremely low cost. During summer months kerosine production averages about 6,000 bbl. daily and during winter months in excess of 10,000 bbl. per day are produced and treated in the kerosine-sweetening unit.

The crudes run at Marcus Hook yield kerosine which is H_2S free and averages about 0.08 per cent total sulfur but which has a maximum mercaptan content 14 mg. per 100 cc. However, the amount of mercaptan present is sufficient to give the kerosine an objectionable odor and a positive doctor-test reaction. By means of doctor treat it would be possible to convert the mercaptan sulfur to the less-objectionable disulfide according to:

$$2RSH + Pb(ONa)_2 \downarrow$$

$$Pb(RS)_2 + 2NaOH$$

$$Pb(RS)_2 + S \longrightarrow PbS + R_2S_2$$

In theory, doctor process is straightforward; but in its practical use nearly all refiners have observed that there is a much greater conversion of mercaptan to sulfide per unit weight of sodium plumbite than would be indicated by the equation. As a result there have been many investigations into the mechanism of secondary reactions and many investigators have formulated hypotheses revolving about the lead sulfide produced by the primary reaction. Most of the investigators have concluded that lead sulfide has a definite catalytic effect in that it influences the velocity of certain side reactions apart from the common doctor reactions. Numerous side reactions have been reported and it is probable that all of these, and perhaps even others, take place at the same time and each to an extent depending upon the concentrations of sulfur, oxygen, and sodium hydroxide used in the sweetening process.

Early development work done at Sinclair stressed the following reaction:

$$2RSH + S \longrightarrow R_2S_2 + H_2S$$

This reaction has been experimentally justified. To propel the action forward it is necessary to remove the hydrogen sulfide formed by the addition of a small quantity of sodium hydroxide solution, ammonia, or other alkali. Once laboratory work had established the validity of the reaction it was necessary to develop equipment so as to make commercial use of the reaction. Some of the problems which had to be solved were:

1. Simple and efficient feed and control of sulfur.
2. Efficient control of injection and dispersion of the alkali through the catalyst bed.
3. Determination of the best practical method of producing lead sulfide catalyst.

During the period in which this process has been used there has been continuous development and improvement so that now nearly all of the problems which gave initial difficulties have been solved. For example, sulfur is added to the treating process in the form of a solution of sulfur in the kerosine to be treated. Lead sulfide catalyst is produced by coating a suitable carrying material with a lead compound which can be effectively converted to the sulfide after the catalyst material has been constructed and put in place ready for use.

The accompanying flow diagram shows the arrangement of equipment and the general flow through the treating unit. Kerosine flow from the stills goes to a cone-roof 3,500-bbl. tank which serves as a water separator. At a height of 6 ft. 6 in. the oil in this tank levels over to another similar vessel which serves as a charging tank for the treating unit. The kerosine to be treated is picked up from this second tank by means of a centrifugal pump and is discharged through six lead sulfide treating towers operated in parallel.

At the discharge of the pump a small slip stream of kerosine is taken to the bottom of either one of two sulfur pots which are filled with crude rock sulfur. As the slip stream of kerosine flows up through the sulfur it tends to become saturated, and upon leaving the top of the vessel it is diverted back to the suction of the charge pump. A small stream of ammonia is also introduced into the suction of the charge pump. Rate of flow of the slip stream going through the sulfur pot is controlled by instrument. It should be noted that the sulfur pot is large enough to prevent any appreciable change in sulfur content of the slip stream as the slip-stream volume is increased or decreased within narrow limits.

It will be noted that the general flow system is quite simple. In general, operation is just as simple and the unit requires a minimum of attention after sulfur flow and ammonia feed are once regulated according to the volume and mercaptan content of stock to be treated.

In practice, it has been found necessary to limit the rate of treating to about 75 bbl. per hour per tower and it is also necessary to limit the size of the towers to the figure shown as excessive channeling takes place when larger-diameter towers are used.

• Theoretically the catalyst life is limitless. Of course, it is impossible to obtain this theoretical life because of the impossibility of maintaining exactly correct operations continuously but it is not uncommon to run towers on the same catalyst for periods of several years. Loss of catalyst, when it occurs, is generally brought about by lack of sulfur and excess alkalinity. The catalyst can be gradually rendered inactive by the introduction of air through leaking packing glands on the charging pump, the air slowly converting the lead sulfide to lead sulfate.

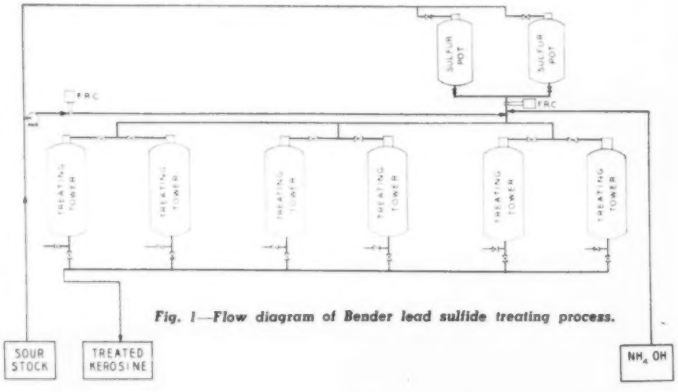

Fig. 1—Flow diagram of Bender lead sulfide treating process.

*Petroleum engineer, Sinclair Refining Co., Marcus Hook, Pa.

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Fig. 1—Large 10-cylinder V-angle-type gas compressor. Three gas cylinders with their connected water piping show in the foreground. Integral operating platform aids movement about the unit during maintenance and inspection.

by Tyler G. Hicks*

2. Compressor Characteristics and Installation

HORIZONTAL, vertical, angle, and opposed reciprocating units predominate in gas-compressor-station work. However, recent installations of centrifugal compressors have shown that there may come a day when the two types are competing more strenuously for supremacy in the gas-compression field. As a result, any worthwhile discussion of gas-compressor-station planning must recognize the future possibility of widespread use of centrifugals. They have several advantages over reciprocating units which make them desirable in terms of initial station cost and operating economy. To date, preliminary studies have shown that the centrifugal compressor is more economical than reciprocating units when the horsepower required is 500 or more. Positive verification of this figure is, however, dependent upon further investigation of the general gas-compression problem.

*Consulting engineer, New York City.

Reciprocating Compressors

Reciprocating units installed today are most frequently in the 150 to 2,000-hp. range when of the V-angle or angle type and driven by gas or diesel engines. Dual-fuel engines which operate on either gas or diesel oil usually have a lower output when operating on the latter fuel. Thus, a typical two-cylinder angle compressor is rated at 175 hp. on diesel fuel and 200 hp. on gas; with eight cylinders it is rated at 700 and 1,000 hp. for the respective fuels.

Electrically driven V-angle and angle compressors are normally built for ratings between 1,500 and 5,000 hp. Horizontal-engine-driven, two and four-cycle heavy-duty reciprocating compressors are most frequently applied in ranges between 50 and 1,700 hp. Heavy-duty, slow-speed, single or twin-type motor-driven horizontal compressors are used in the 500 to 3,000-hp. range. One to six stages of compression can be used, as desired. Opposed compressors range in power from 150 to about 5,000 hp.

The number of cylinders used in the driving engine varies from 2 to 10; 4, 6, and 8 are most popular. The number of compressor cylinders may be two to four, according to station load. Both four and two-cycle engines are used for compressor drive but at the present time about 85 per cent of gas-engine-driven compressors are two-cycle units. Single and two-stage compressors are common because conditions vary from one station to another and sizable power savings are often possible when two-stage compression is used. Three stages of compression are also used, though not as frequently as single and two-stage.

Exact determination of the number of stages of compression to be used is a complex problem dependent upon several factors such as total horsepower of the station and funds available for construction. However, studies by compressor designers have shown that when the outlet pressure of the compressor is four to five times the inlet pressure, two-stage compression is more economical than single-stage compression insofar as power input is concerned. Power savings resulting from two-stage compression are shown graphically in Fig. 2. Below about four compressions, single-stage compression is usually more economical because friction, and inlet and outlet losses are less.

Piston speeds.—The history of modern internal-combustion-engine-powered gas compressors can be said to be one of increasing piston speeds.

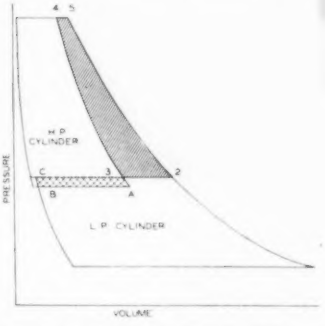

Fig. 2—Power savings resulting from two-stage gas compression. The area 2-5-4-3 represents the amount of work saved by compressing the gas in two stages instead of one. The area b-a-3-c represents the work which is lost by cooling the gas in an intercooler between stages. The loss, actually repeated work, results from the pressure drop during passage through the intercooler.

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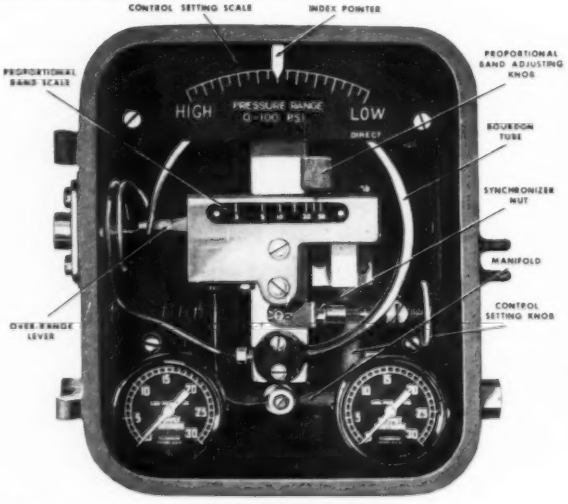

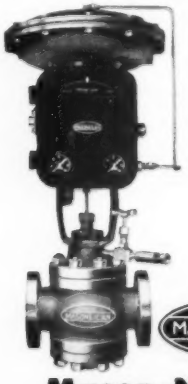

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Ever since about 1900, when the modern compressor station first got its start, piston speeds have been increasing. Today, some compressors are built for piston speeds as high as 850 ft. per minute. Usually, though, it is considered better practice to keep piston speeds in the 650 to 800-ft.-per-minute range, the lower limit being for small-capacity compressors and the upper limit for large units. Compressor rotative speeds are made to correspond to the above piston speeds and vary from about 800 r.p.m. for a 6-in.-stroke unit to 150 r.p.m. for a 30-in.-stroke unit.

Valves.—Compressor intake and discharge valves vary in construction from one manufacturer to another but are usually of the automatic type as distinguished from the mechanically actuated type. Poppet valves are common in small compressors and in the high-pressure stages of high-pressure compressors. For most other services, the lightweight plate or strip valves are used. Plate valves are of three types: (1) unattached and independent, (2) semiattached strip or ribbon valves, and (3) rigidly attached disk valves with integrally connected rings and spring elements.

Gas velocities through inlet and discharge valves vary from approximately 3,500 to 5,000 ft. per minute, according to the pressure rating of the compressor. In low-pressure units, velocities range from 3,500 to 4,000 ft. per minute; for higher pressures, velocities up to 5,000 ft. per minute are used. With high rotative speeds and rather low piston speeds, these ranges may sometimes be exceeded but they represent accepted practice for low rotative speeds and high piston speeds.

Pressure ranges.—Operating temperatures and stresses in compressor materials set limits on the maximum allowable discharge pressures but some pressures in use today are almost 50 times those used in 1900. For instance, in a recently completed gas-compressor station in the Texas Gulf Coast area, wet gas enters nine 1,000-hp. compressors at subatmospheric pressure and is discharged to processing equipment at 715 psia. Three stages of compression are used. In this same station, three 800-hp. compressors raise residue-gas pressure in the first stage to 1,570 psia. If desired, the residue gas can be compressed in the second stage to a pressure of 3,515 to 5,000 psia., maximum. Hence, it can be seen that extremely high pressures are obtainable with standard compressors. The maximum pressure rating for reciprocating compressors available today is about 15,000 psi.

Of course, all intermediate pressures between subatmospheric and about 15,000 psi. are obtainable with standard model compressors. The majority of stations being planned at present handle gases at what might

be termed intermediate pressures, 250 psi. to 1,200 psi. or thereabouts. It is easy to see, however, that with increased natural-gas processing, underground storage, repressuring, and recycling, compressor discharge pressures will steadily increase. Higher discharge pressures do not simplify the station designer's problems; instead they make them more complex because piping and auxiliary equipment must be planned to withstand the higher temperatures and stresses encountered.

Compressor controls.—Each manufacturer has developed controls suitable for his particular units and, in general, these have proved satisfactory. In field gas-compressor stations the control problem has sometimes been complicated by the decreasing nature of the supply pressure. When first installed, the compressors may be required to handle gases at high pressure but as time goes by the supply pressure decreases to atmospheric or less. Controls which permit the compressor to operate efficiently at all loads under these varying conditions are rather complex in design and usual practice permits the compressor builder to recommend the most suitable type for each application.

Semiautomatic, pneumatically operated unloaders are now rather common on many compressors. They provide needed control at only slight additional cost. Operating economy has been appreciably improved by use of these unloaders. Use of clearance pockets and speed regulators permits compressor operation at any capacity from zero to full load without expensive control devices.

Centrifugal Compressors

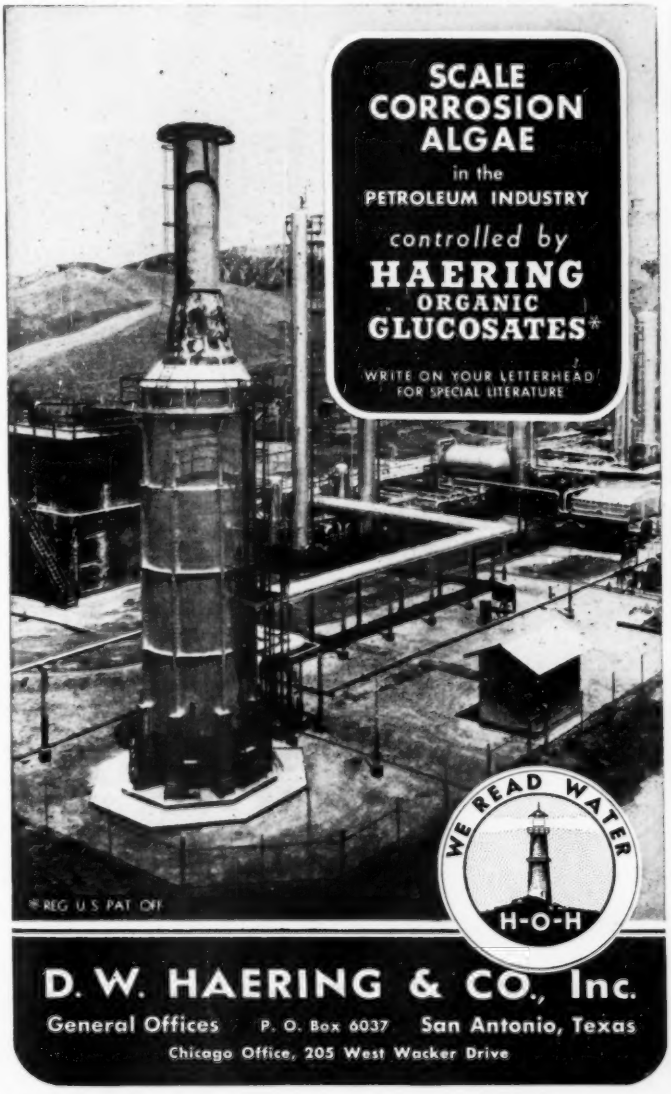
Within recent years, some manufacturers of reciprocating compressors have added the centrifugal and axial-flow compressors to the line of units produced. Centrifugals have found applications in gas compression, storage, dehydration, absorber-tower compression, lean-oil cooling, repressuring, and recycling. Because centrifugals are essentially high-speed, large-horsepower units, steam, gas, turbine, or electric-motor drive is usually necessary. Use of internal-combustion engines is generally impractical because operating and maintenance costs are generally higher than for equal power turbines or motors. Besides, use of turbines or motors permits direct drive of centrifugal compressors, whereas an internal-combustion engine would require use of a speed increaser.

Power requirements of usual centrifugal compressors vary between about 300 and 22,000 hp. Gas turbines are used to drive units to 1,500 hp. or more. Axial-flow compressors up to the 30,000-hp. range are available. Drives for these units must be steam, gas turbines, or electric motors. Table 1 summarizes common characteristics of typical gas compressors used today. Centrifugals can handle 2,000 to 60,000 cu. ft. per minute of gas and discharge it at pressures up to 300 psi. Axial-flow compressors handle gas volumes of between 20,000 and 300,000 cu. ft. per minute with discharge pressures up

TABLE 1—CHARACTERISTICS OF TYPICAL MODERN GAS COMPRESSORS

Compressor type—	Motor-driven horizontal	Portable angle type	Large angle type	Centrifugal type	Axial flow type
Hp. range	5 to 3,000	75 to 600	200 to 5,000	300 to 22,000	up to 30,000
Driver capacity, hp.:					
Electric motors	All	150 to 600	All	All	All
Gas engines	5 to 1,700	75 to 350	200 to 2,200		
Diesels	5 to 1,700	100 to 400	200 to 2,000		
Steam turbines				All	All
Gas turbines				1,500 hp. and up	1,500 hp. and up

Note: Units of different manufacturers may vary somewhat from the values given here but these values are sufficiently accurate for most preliminary estimates.



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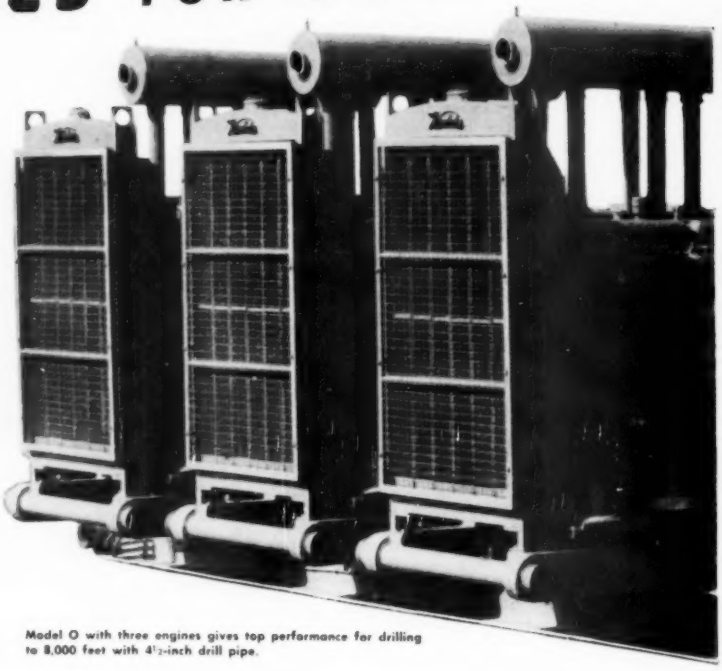

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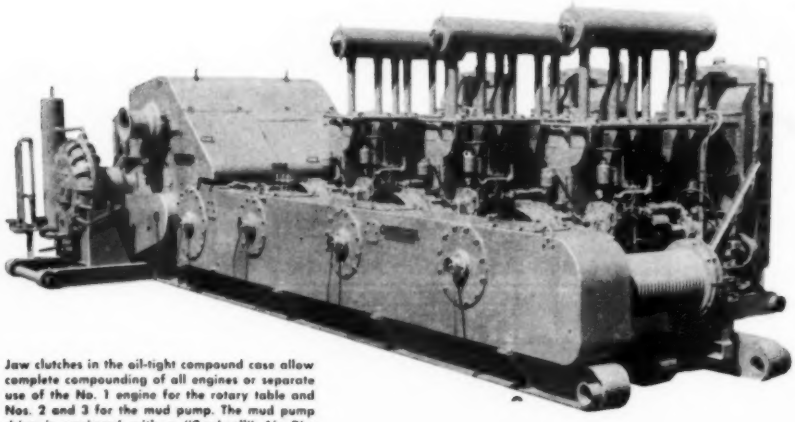

Jaw clutches in the oil-tight compound case allow complete compounding of all engines or separate use of the No. 1 engine for the rotary table and Nos. 2 and 3 for the mud pump. The mud pump drive is equipped with a "Cardwell" Air Disc friction clutch.

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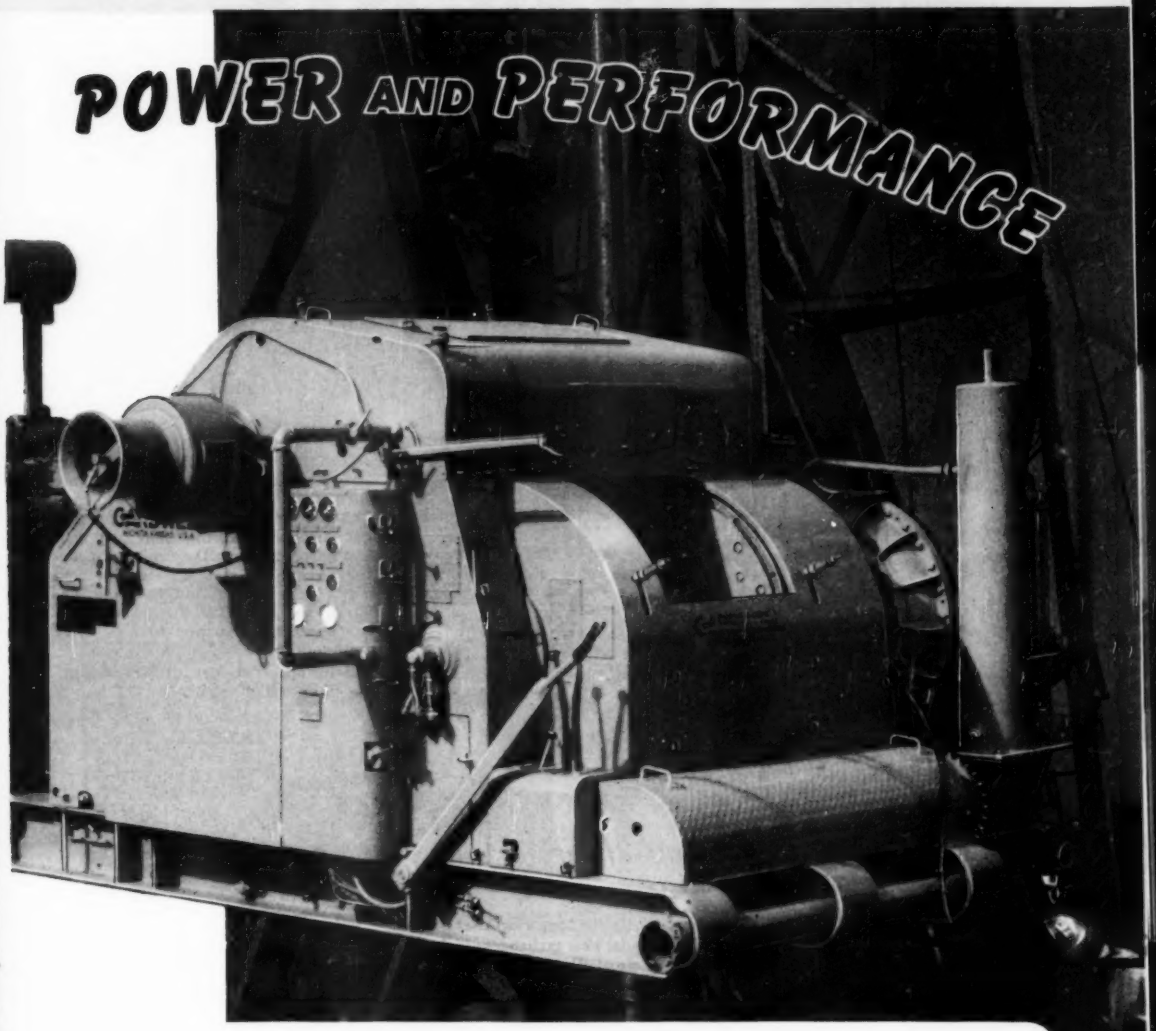

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Compressor Gas Piping

Improperly sized and arranged compressor piping has caused more trouble in station operation than any other single factor. These troubles can be traced to the methods used for sizing compressor supply and discharge piping. In general, pipe sizes corresponding to the inlet and outlet openings on the compressor cylinder are satisfactory when only one cylinder takes its suction from, or discharges to the line. When more than one cylinder is served by the pipe, the size must be based on the actual amount of gas flowing to and from the cylinders at maximum rate.

The quantity of gas drawn into or discharged by a compressor cylinder is numerically equal to the product of the cylinder capacity in cubic feet per minute and the volumetric efficiency of the cylinder, or:

$$CFM_d = (CFM_r)\,(VE) \qquad (1)$$

where

CFM_d = cubic feet per minute of gas drawn into or discharged by the cylinder

CFM_r = rated capacity of cylinder, cubic feet per minute

VE = cylinder volumetric efficiency, expressed as a decimal

Sizing suction and discharge lines.—If suction and discharge pipe sizes are based on the quantity of gas taken in and discharged by the cylinder, computed as above, the pipes will usually be undersize because the rate of gas flow to and from the cylinders is not a function of cylinder capacity alone. It also depends on the piston velocity during the intake and discharge stroke. Since angularity of the connecting rod causes a difference in the piston velocity during outward and return strokes, gas flow rate is actually dependent upon the average velocity or time required for the suction and discharge strokes. Once a suitable horsepower compressor has been selected for a given station, the actual flow to the cylinder can be computed as follows:

Problem.—A gas-compressor cylinder rated at 150 cu. ft. per minute has a volumetric efficiency of 78 per cent during suction and 40 per cent during discharge. The compressor is a double-acting unit which operates at 250 r.p.m. Connecting-rod angularity and valve action are such that gas intake occurs during 72.3 per cent of one revolution and gas discharge during 39.8 per cent of one revolution. Determine the actual gas quantities flowing to and from the cylinder and the pipe capacity necessary for suction and discharge headers serving four of these cylinders.

Solution.—The gas drawn in during the suction stroke is:

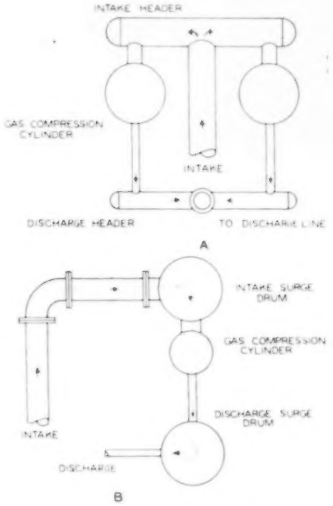
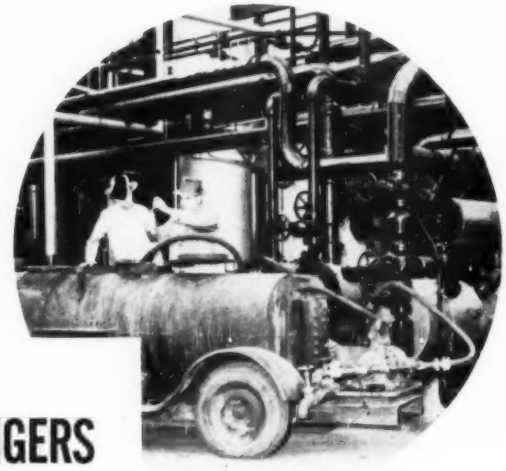


Fig. 3—(A) Suction and discharge headers as used on multicylinder compressors. The large volume of the headers helps prevent pulsations in the connected piping. (B) Intake and discharge surge drums for a single-cylinder gas compressor. Surge drums produce the same effect as intake and discharge headers.



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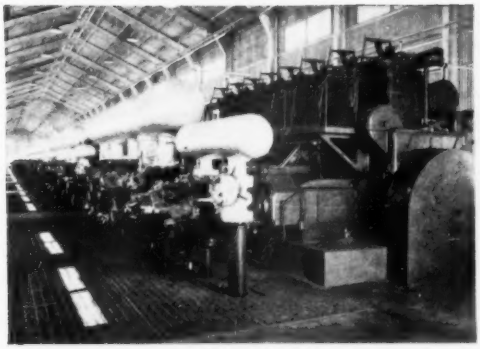
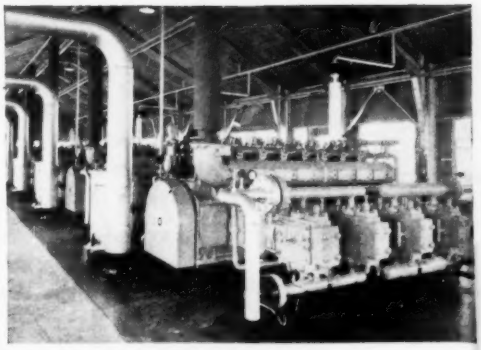
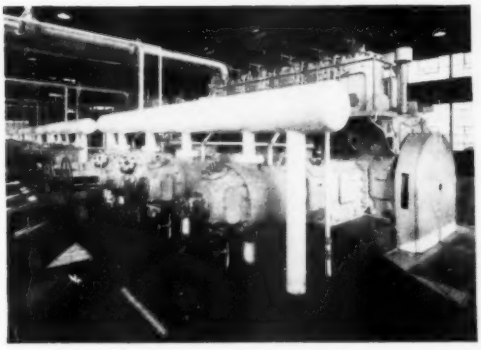


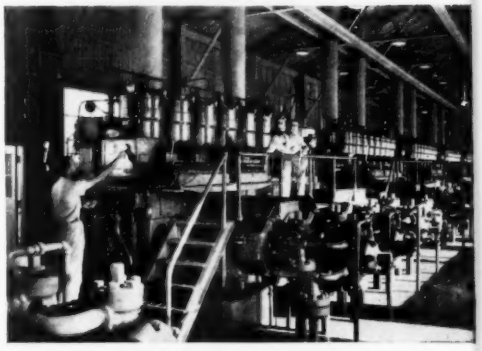
NATURAL GASOLINE



REPRESSURING



PIPELINES



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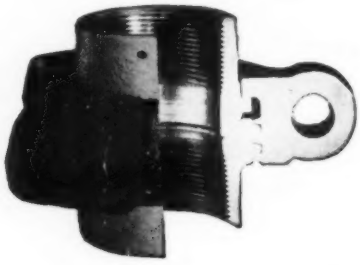

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Discharge = 150 (0.40) = 60 cu. ft. per minute

However, since suction takes place during only 72.3 per cent of the time required for one revolution, gas flow rate through the inlet pipe during this time is 117/0.723 = 162 cu. ft. per minute. Because discharge takes place during only 39.8 per cent of one revolution, gas flow rate through the discharge pipe during this period is 60/0.398 = 151 cu. ft. per minute. Therefore, it readily can be seen that pipes sized on the basis of the product of compressor-cylinder capacity and volumetric efficiency would be too small and would cause excessive pressure losses. If the compressor were forced to carry its rated load, the driving engine or motor would be seriously overloaded. Suction pipes based on compressor cylinder "capacity," i.e., the above-mentioned product of displacement and volumetric efficiency, would be undersize by about 27 per cent. Discharge pipes would be undersize by about 60 per cent.

Size of gas header.—The necessary capacity of the gas headers for four cylinders is found as follows: The suction header would have to have a maximum capacity of (4 compressor cylinders) (162 cu. ft. per minutes per cylinder) = 648 cu. ft. per minute, say 650 cu. ft. per minute. Discharge header would need a maximum capacity of (4) (151) = 604 cu. ft. per minute, say 605. Both headers would be sized to pass the respective quantities of gas with a nominal drop in pressure. Note that in both cases the larger quantity of gas is not actually being discharged for an extended period. Actually what occurs is a more or less pulsating discharge of the smaller gas quantity at the higher rate.

Of course, this condition is recognized by all compressor manufacturers and they size inlet and outlet openings accordingly. However, as is usually the case, compressor-station designers lay out the piping connections to and from the compressors. It is during this stage of planning that the actual rate of suction and discharge is important.

Surge Drums

Intake and discharge headers, Fig. 3A, are often made oversize so that they act as reservoirs during compressor operation. Because gas pulsations are decreased, headers frequently increase the operating efficiency of units to which they are connected. Headers are most common on multicylinder compressors. For single-cylinder compressors, surge drums connected to the inlet and outlet piping, Fig. 3B, will per-

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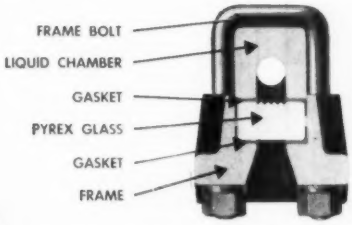

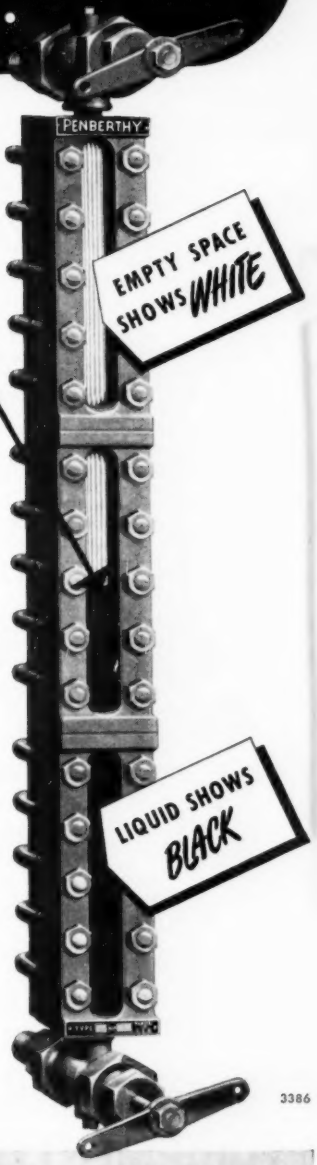

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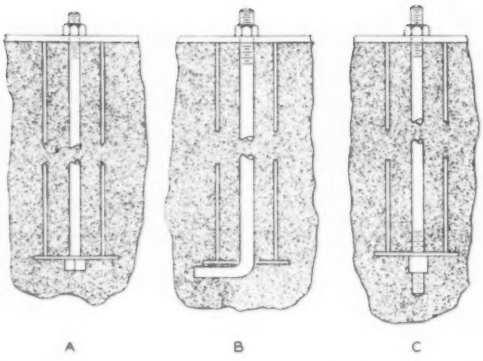

Fig. 4—Anchor bolts commonly used in gas compressor foundations. (A) and (B) are nonremovable types which are not too practical for large compressors because they are difficult to remove after breakage. (C), a removable type, is best for large compressors.

form the same function as similar headers. Surge drums have often been omitted from single-cylinder compressors because the power savings did not appear worth the extra initial investment for drums. However, when it is recalled that many gas-compressor stations, both large and small, operate for periods approaching 20 years, the extra investment for surge drums can usually be justified.

Besides increasing compressor efficiency, surge drums reduce pipe-line pulsations. Noise, piping vibration, and variations in compressor capacity which sometimes accompany pipeline pulsations is also reduced. Therefore, it appears that there can be few valid reasons for dispensing with properly sized drums in single-cylinder gas compressors. Recent advances in the study of compressors and pipe-line pulsations will soon permit analytical investigations of the best drum volume and dimensions for many sizes of compressors.

Foundation Bolts

Once a proper size compressor has been chosen, its connections to the foundation must be designed. Anchor bolts commonly used, Fig. 4, are of three types. The nonremovable hook and bolt types are less desirable than the removable type because they are difficult to repair after breakage. Better installations are obtained when the gas-compressor-station designer locates the foundation bolts, specifies the great thickness to be used, and gives details of the foundation bolt material. Good practice calls for pipe casings around all foundation bolts. Internal diameter of the casing should be at least 2 in. greater than foundation bolt diameter to permit ample movement of the bolt. Anchor bolts should be constructed of rot rolled material having minimum physical properties as follows:

Tensile strength—65,000 psi.
Yield point—38,000 psi.
Elongation—25 per cent in 2 in.
Brinell hardness—117.
Hot rolled material.

A layer of grout about $1\frac{1}{2}$ in. thick is usually applied between the compressor foundation block and machine bedplate. Leveling wedges, preferably of steel, should be removed after grouting the compressor to the foundation. If the wedges are left in place, the grout may shrink away from the bedplate or foundation and allow the wedges to carry the entire weight of the compressor. When the wedges are removed after grouting the entire load of the compressor will always be taken by the grout. Foundation bolts should not be tightened until after the grout has hardened. Properly grouted gas compressors are held in place by bolt friction and grout adhesion, not by a pin action of the bolts.

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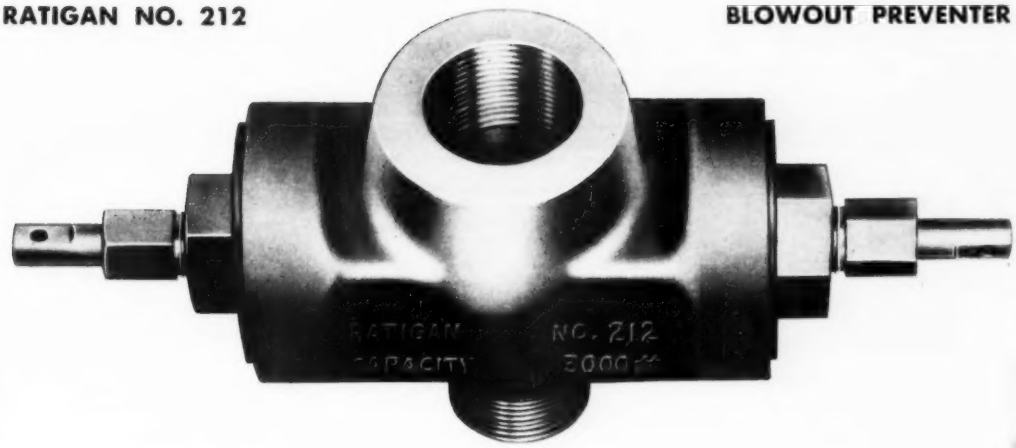

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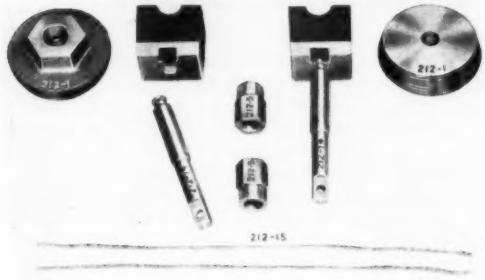
Two of these blowout preventers of the same size, with a nipple of any required length in between, make an efficient unit for swabbing. The device also can be used for running rods in well that head or flow in the course of operations.



The No. 212 is made in 2½" and 3" sizes, both plain and upset. The 2½" plain type can be supplied in double-female, and if male and female are required, a short nipple can be used to make the change. The 2½" upset can be supplied in male and female or double-female types. The 3" size is supplied in male and female types only; but the male connection easily can be converted to female by installing a 3" collar, making a double female unit.

Ratigan products are the result of thirty years of specialized oil field engineering experience, and are accepted leaders of their respective types. Consult your latest edition of the Composite Catalog for detailed descriptions, specifications and list prices.

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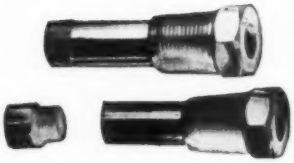

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Viscosity of Residuum Blends

We want to cut back our cracked fuel oil with distillate. How much distillate must be used to cut a 650 Furol viscosity at 122° F. residuum with a 40 viscosity at 100° F. gas oil?—C. A. P.

Regular viscosity blending charts such as those published in The Refiner's Notebook No. 100, July 1946, page 107 of The Oil and Gas Journal, in Petroleum Refinery Engineering, Third Edition, 1949 (McGraw-Hill Book Co., New York), page 161, and by the A.S.T.M. Viscosity Temperature Charts (American Society for Testing Materials—1916 Race Street, Philadelphia) can be used with fair success for the blending of such materials. However, the amounts of cutting agent required are usually so small that the accuracy is not good. For this reason it is usually advisable to make experimental blends—and in fact, such blends should be made regularly because of current changes in the stocks. Refer also to "Blending Viscous Oils," The Oil and Gas Journal, May 6, 1948, page 110, which tells specifically how to use the above charts.

Not many sets of laboratory results have been published. However, Table 1, taken from F. L. Smith, "Blending Residual Fuel Oil," Petroleum Refiner, April 1945, page 95, indicates results with two California residuums (and gas oils). Both the straightrun and cracked residuums had a viscosity of 100 seconds Furol at 122° F. (this is approximately 2,500 seconds Universal at 100° F.) and both the straightrun and the cracked gas oils had a viscosity of 39 seconds Universal at 100° F. The cracked residuum was cut with cracked gas oil, and likewise the straightrun stocks were used together.

TABLE 1—CUTTING OF VISCOSITY OF CALIFORNIA RESIDUUMS WITH GAS OILS

Viscosity of blend, Furol at 122° F.	Per cent of gas oil used — Cracked blends	St. Run blends	Computed*
100	0	0	0
90	1.5	1.2	1.7
80	3.2	2.5	3.5
70	5.5	4.2	5.0
60	7.5	6.0	7.5
50	10.7	8.0	10.0
40	14.5	12.0	13.0
30	20.7	16.0	19.0

*Approximations using an assumed viscosity temperature relationship, and the blending chart published in Refiners Notebook No. 100, July 6, 1946, page 107 of The Oil and Gas Journal.

Table 2 shows similar information on a 300-viscosity Furol at 122° F. stock, but it shows only computed or estimated values.

TABLE 2—ESTIMATED CUT-BACK OIL REQUIRED FOR A 300 S.F.S. AT 122° F. STOCK

Viscosity of blend, Furol at 122° F.	Per cent gas oil in blend
300	0
200	5
150	8
100	12
80	15
60	19
40	24

It is not the policy of this department to answer inquiries in a specific way, merely to indicate how the reader can solve his problem. Hence, C.A.P. must be cautioned that a 650 Furol viscosity stock will not have much of a tolerance for distillate. More than about 10 per cent of distillate may cause the precipitation of asphaltic material or instability when heated by steam coils. In this regard refer to this page, "Blending No. 5 from No. 6 Fuel Oil," September 15, 1949, page 133.

Small Exchanger Costs

In your Cost-imating you show the costs of exchangers but only down to about 150 sq. ft. area. What are the costs of small exchangers such as those used in pilot plants?—R. F. P.

Very small exchangers are specials, not many of them are sold, and the costs on a square-foot basis are so large that few manufacturers are interested in manufacturing them. Even double-pipe exchangers built of full-length pipe joints contain 2 to 10 sq. ft. of area per joint and the standard small fin-tube (two joints) contains about 100 sq. ft. Furthermore, these are awkward because of their length. In general, the cost of small or pilot-plant exchangers should be figured from the cost of the pipe and fittings employed.

Only one set of cost data that pertain to small exchangers is available to this department. This applies to the helical-coil units of Graham Manufacturing Co., Inc. (415 Lexington Avenue, New York) which might be used for some situations. The units consist of helical coils attached to a feed manifold and laid one on top of another so that the shell-side fluid must also travel in a helical path. They are very compact. The approximate cost of such units based on 1946 prices (factor of about 1.28 for 1949 costs) are shown in Fig. 1 for units consisting of steel tubes and a cast iron housing or shell. Certain stock units may be obtained at slightly lower prices. Note that costs extrapolated from Cost-imating No. 1 (October 28, 1948) in The Oil and Gas Journal are higher than the costs of helical units.

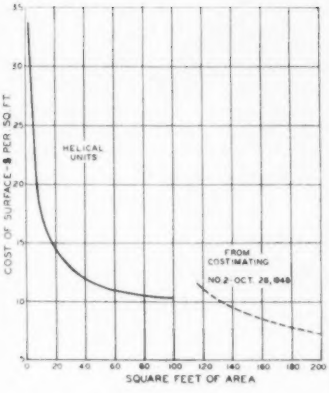

Fig. 1 — Approximate cost (1946) of small exchangers.

Formaldehyde for Sulfide Corrosion

Is there any basis for the belief that formaldehyde, inducted into pumping wells making water, has the effect of reducing sucker-rod breakage?—H. K.

Most definitely, formaldehyde is of assistance in alleviating hydrogen sulfide corrosion. Of course, situations vary widely and hence results may range from nil to almost 100 per cent protection. The only case in which formaldehyde is definitely of little value is in connection with somewhat large electrolytic currents. Here are several references:

1. Menaul, P. L., "Formaldehyde as an Inhibitor of Corrosion Caused by Hydrogen Sulfide Saturated Brines," Petroleum Technology, January 1946.

2. Barnes and Deegan, "Corrosion Inhibitor Promises Huge Returns," The Oil and Gas Journal, October 27, 1945.

3. Clay, J. A., "Use of Formaldehyde to Inhibit Corrosion," Petroleum Engineer, November 1946.

4. Laudermilk, J. I., "Corrosion Problems," The Oil and Gas Journal, December 7, 1946.

5. Menaul, P. L., "Investigation and Control of Condensate Well Corrosion," Corrosion, Vol. 2, No. 4, October 1947, p. 195.

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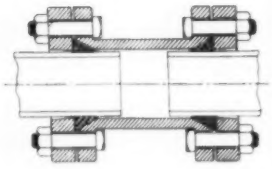

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ENARDO TANK SAMPLE BOX eliminates thiefing. Accurate samples are taken from ground level. No stairs or ladders to climb. Reduces fire hazard and eliminates chances of personal injury and exposure to sour gas. No vapor losses while sampling.

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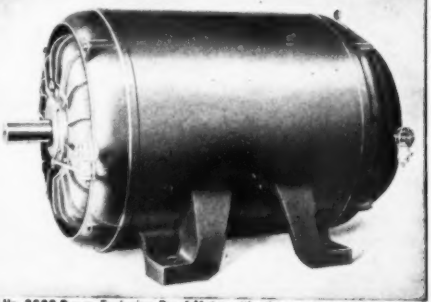
EXPLOSION-PROOF MOTORS
1 to 600 Hp.



150 Hp. 3600 R.p.m. Explosion-Proof Motor with oil lubricated ball bearings

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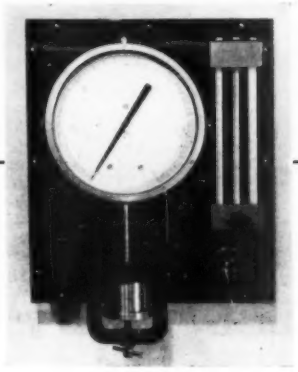

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The Refiner's Notebook

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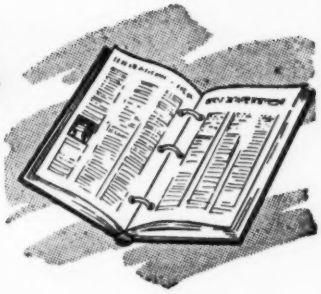


Instrument Symbols

BASIC instrument symbols and typical arrangements are indicated using the letter combinations presented in the previous issue. While it is expected that many individuals will continue to use their own system of symbols, others have indicated interest in the I.S.A. published system. Additional typical arrangements employing this system will be incorporated in discussing refinery instrument applications in succeeding installments of The Refiner's Notebook.

BASIC SYMBOLS

INSTRUMENT PROCESS PIPING (Pressure, Differential, Etc., Connecting Lead Lines: Also Hydraulic Actuating Medium Lines)
INSTRUMENT AIR LINES
INSTRUMENT ELECTRICAL LEADS
INSTRUMENT CAPILLARY TUBING

All lines to be fine in relation to process piping

Locally Mounted | Board Mounted

INSTRUMENT WITH SINGLE SERVICE AND FUNCTION

COMBINATION INSTRUMENT OR DEVICE WITH TWO SERVICES OR FUNCTIONS

TRANSMITTER

DIAPHRAGM MOTOR VALVE

SAFETY (RELIEF) VALVE

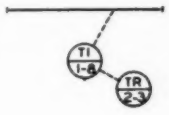
ELECTRICALLY OPERATED VALVE (SOLENOID OR MOTOR)

PISTON OPERATED VALVE (HYDRAULIC OR PNEUMATIC)

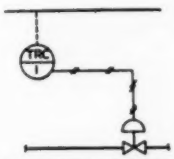
SELF-ACTUATED (INTEGRAL) REGULATING VALVE

MANUALLY OPERATED CONTROL VALVE

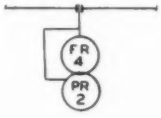
TYPICAL ARRANGEMENTS



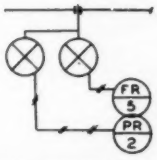
TEMPERATURE INDICATING AND RECORDING POINT CONNECTED TO MULTIPOINT INSTRUMENTS ON BOARD



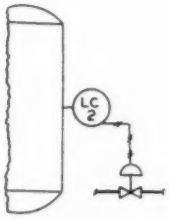
TEMPERATURE RECORDING CONTROLLER, BOARD MOUNTED (ELECTRIC MEASUREMENT)



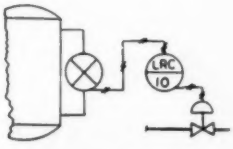
FLOW RECORDER, MECHANICAL TYPE, WITH DIRECT CONNECTED PRESSURE RECORDING PEN, LOCALLY MOUNTED
(Note that in listing such a combination item in specifications, etc., it would be written as FR-4 and PR-2, thereby treating each element as separate entity)



FLOW RECORDER WITH PRESSURE RECORDING PEN, BOTH ELEMENTS PNEUMATIC TRANSMISSION, TRANSMITTERS LOCAL, AND RECEIVER BOARD MOUNTED
(Receiver should be written as FR-5 and PR-2, and each transmitter identified by its own element)



BLIND LEVEL CONTROLLER, INTERNAL TYPE



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PIPE LINES

Frontier Studies Plans For Cheyenne-Omaha Line

Frontier Refining Co. has authorized Pacific Pipe Line & Engineers, Ltd., to conduct an economic study and engineering survey for a products line under consideration from Cheyenne, Wyo., to Omaha. The Frontier company, according to M. H. Robineau, president, is studying the feasibility of a project which would entail construction of a line all the way to Omaha connecting with the Great Lakes Pipe Line Co. system. There might be terminals on such a line at Sidney, North Platte, and Grand Island, Neb. A study is also being made of the feasibility of shorter lines to any one of the intermediate points. Definite decisions regarding the undertaking have not yet been made.

Pipe diameters have been spoken of as 6-in. and 8-in. Possible lengths of the lines involved in such projects have not been given. Measurements on the map indicate that a pipe-line route from Cheyenne to Omaha with outlets at the points mentioned might have a length of 470 to 480 miles.

Associated to Build Gas Line in Missouri

Associated Natural Gas Co., Tulsa, has asked Federal Power Commission for authority to build a $900,000 pipeline system in southeastern Missouri.

The Associated company, headed by F. E. Stanley as president, was organized 3 years ago by a group of men connected with Midwestern Constructors, Inc., Tulsa, including R. C. Stanley, Clyde Wyant, B. L. Weller, and A. T. Tolbert. Associated with them are Roy Blackbird, Houston, and R. W. Overton, formerly of Tulsa and now located at Sikeston, Mo.

The company plans construction to start April 1 for 35 to 36 miles of 6 and 8-in. lines which will include 14½ miles from a connection with the Texas Eastern Transmission Corp. (Big Inch and Little Inch system) line near Oran, Mo., to Sikeston, and 21 miles of line from Sikeston to New Madrid.

In addition, the company plans to build gas-distribution systems in Sikeston and New Madrid, with connections to serve ultimate consumers in rural areas near those cities.

The company said that within the next 5 years it plans to extend service to the Missouri communities of Charleston, Oran, Chaffee, Benton, East Prairie, Lilbourne, Bernie, Morehouse, Bloomfield, and Essex. The company did not ask for authorization of those facilities, however.

The project would be financed by the issue of $200,000 in common stock, $450,000 in 4½ per cent first mortgage bonds, and a $250,000 bank loan from J. P. Morgan & Co., New York.

The company said the stock issue has been subscribed in full, and the Northwestern Mutual Life Insurance Co. has agreed to buy the bonds.

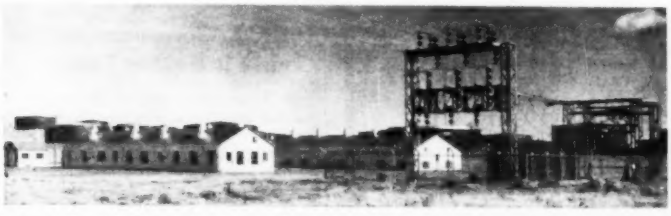
The company plans to complete the job about the end of September.

The commission a year ago directed Texas Eastern to supply Associated Natural Gas Co. with up to 3,000,000 cu. ft. of natural gas a day.

Texas Pipe Line Co. to Construct 42-Mile Line

HOUSTON. — A 42-mile crude-oil pipe line will be constructed by Texas Pipe Line Co. from Patoka, Ill., pump-station site to Clay City, Ill., pump-station site, R. B. McLaughlin, president of the pipe-line company, announced last week.

The line, which will be 12¾ in. in diameter, will be built by the L. R. Young Construction Co., Olney, Ill. Work is scheduled to begin within the next 60 days.



Pump station building (left) and manifold building (right) for Stanolind Pipe Line Co.'s Casper, Wyo., station which serves as an important junction point in the handling of Rocky Mountain crude.

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Note in the above illustration how the WeldOlet tapers to provide a single bevel groove joint at the crotch section and blends into a V-butt joint at the ear portion.

WeldOlets need no additional reinforcement to establish and fully maintain original strength on ASTM A-106 Seamless Steel Grade A Pipe, as set forth in Code for Pressure Piping, American Standards Association, B31.1-1942, and Supp. No. 2, B31.1-b-1947.

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For detailed engineering reference data, write for Catalog W-2.

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ThredOlets — Available as standard, with outlet sizes ⅛" - 10", both straight and reducing, for use with Schedule 40 pipe. Also available in Schedule 80 up through 2" outlet size.

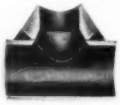

Fig. 1—Cut-away view of reducing size WeldOlet with welding outlet in place. The external rib and wide bases or footings of WeldOlets eliminate the need for extra supports to take care of bending or vibrational stresses at crotch section, the point of greatest stress.

Fig. 2—Note blending of ear portion of welding fitting to run pipe. Extension of weld metal below inside scarfed portion of pipe insures all sections of joint greater than pipe wall thickness.

Natural-Gas Companies Have Boston, Mass., Offices

In preparation for the construction of natural-gas lines into New England, two companies organized for serving that area have offices in Boston.

The headquarters of Northeastern Gas Transmission Co. are at 110 State Street. The address of James S. Eastham, secretary, Algonquin Gas Transmission Co. is P. O. Box 361, Back Bay Annex.

Dana M. Swan, president of Algonquin, is located at the Providence Gas Co., 100 Weybosset Street, Providence, R. I.

Standard (N. J.) Reduces Ownership in Plantation

Standard Oil Co. (N. J.), has announced that in order to reduce its ownership of the stock of Plantation Pipe Line Co. to less than a majority interest, it has sold some of its shares to Standard Oil Co. of Kentucky and Shell Oil Co. The latter two companies, with Jersey, were the founders of Plantation and are its present stockholders.

The sale by Jersey reduces its holdings from 50.4 per cent of the shares and results in a present ownership of 48.83 by Jersey, 27.13 by Standard of Kentucky, and 24.04 by Shell.

Heavy Flow Reported at New River-Lock Pipe Line

Lester Wright, president of Emergency Illinois Waterway Pipe Line Co., a nonprofit organization, reported recently that first heavy use of a pipe line which the organization built around the Lockport locks on the Illinois River has begun. Approximately 10,000 bbl. of oil were pumped through the line in a 7-hour period during one weekend.

Wright estimated that between 400,000 and 500,000 bbl. of oil will be put through the line during February. It was built to allow petroleum-product movement up the river while the locks are closed for a 6-week repair operation.

The locks are to resume operation by the end of this month.

N.A.C.E. Corrosion-Control Course Is Held in Tulsa

A 4-day corrosion-control training course featuring, among other things, cathodic-protection practices, and sponsored by the Tulsa Section, National Association of Corrosion Engineers, was held in Tulsa this week.

R. L. Bullock, chairman, was director, with F. E. Pyeatt, J. R. Cowles, J. N. Hunter, Jr., J. C. Stirling, and I. B. Tietze, assisting.

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Stanolind Revamps Fort Laramie, Wyo., Station

To improve handling of Wyoming crude oil Stanolind Pipe Line Co.'s Fort Laramie station recently was revamped and transferred from the company's Nebraska to its Wyoming division, J. R. Polston, general manager, announced. Formerly under Area Superintendent W. S. Partner of Scottsbluff, Neb., the station now is under Area Superintendent R. R. Strand, Casper.

Since a traffic engineer is headquartered at Casper to expedite oil dispatched through Fort Laramie station, the division transfer will bring closer coordination of oil movement, Polston said.

An extensive construction program is nearing completion at the station. Two 46,375-bbl. steel tanks, two skid-mounted 300-hp. Cooper Bessemer pumping units, and two 25-hp. suction booster pumps are being installed to supplement present facilities.

The skid-mounted pumping units will be used as a spare and will only be operated when one of the present older units is shut down for repairs.

The two portable units have been mounted on 25-ft. concrete slabs in a temporary wood and sheet-iron structure near the pump station. The combined capacity of the two portable units is 1,400 bbl. per hour at 700 psi.

Fort Laramie is a "hub relay-control" station. It is on the main line between Welch station, Wyoming, and Mitchell station, Nebraska. It is 79 miles southeast of Welch station and 42 miles west of Mitchell station. One of Stanolind Pipe Line Co.'s 98 main-line stations, Fort Laramie is on the company's Wyoming-Freeman, Mo., line. At the Missouri station connection is made to the firm's Gulf Coast-Chicago line. The company has 11,300 miles of lines in 10 states.

In addition to deliveries coming through a 12-in. line from Welch station, Fort Laramie station receives from and delivers to a number of connecting carriers.

An earthen fill had to be made for the two new tanks being erected by Chicago Bridge & Iron Co. Manifolds are being overhauled to accommodate the new tanks.

At the present time Fort Laramie station has six tanks. Some of them are distant from the station and connected with small lines. In order to fill the station pumps properly, and utilize full capacity of the tanks, it was necessary to install booster pumps on the tank lines. The suction booster pumps, which have been in operation since January 5 have corrected this. The two units are 25-hp. electric motors that drive Johnston vertical turbine pumps. Their completion dates will depend upon the weather, but should be early this year.

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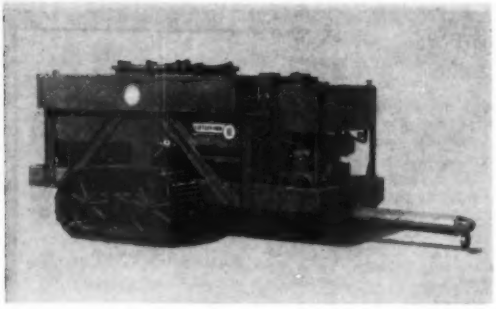

HYDRAULIC AGITATED KETTLE . . . Model 211-20. This kettle has only one burner furnishing the heat—lights instantly—no preheating—no electrical ignition—burns diesel fuel or kerosene—burner is low pressure type assuring even distribution of heat which prevents warping or burning out bottoms—made with Trac-Type wheels or Skids for truck mounting.

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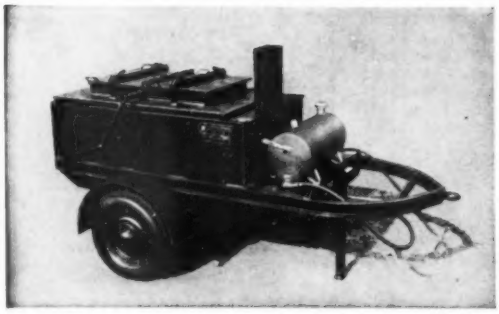

HAND AGITATED PATCH KETTLE . . . Model 84-HD. This kettle has a sweep on the inside and can be operated from either side. Fast trailing is possible with the Model 84-HD Kettle. A one man operated stiff leg of strong channel iron is provided at the front to support the kettle in the standing position.

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Pipe-Line Construction

FOLLOWING is a tabulation of pipe-line projects, both domestic and foreign, which are planned or under construction. Included are crude-oil, products, and natural-gas lines. The list was compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines—Domestic

Gulf Refining Co.—30 miles 8-10-in. lateral in Scurry County, Texas, under construction.

Humble Pipe Line Co.—371 miles, 18-in., under way, West Texas-Satsuma Station to Baytown, Tex.; 178-mile western section contracted to Morrison Construction Co.; 193-mile eastern section contracted by Anderson Brothers Corp.

Magnolia Petroleum Co.—60 miles 4-24-in. gathering system in La Ward and Lolita fields, Texas; Henry L. Lemons & Co., contractor; W. A. Remington in charge.

Mid-Valley Pipe Line Co. (Sun and Sohio)—1,000 miles, 20-22-in., under way, Longview, Tex., to Mayersville, Miss.-Covington, Ky., to Lima, Ohio. Contracts let for 857 miles as follows: Section 2, Haynesville, La., to Mayersville, Miss., Latex Construction Co.; spread office, Farmerville, La.; F. A. Silar, general superintendent; W. A. Briley, spread superintendent; office at Haynesville, La., W. H. Hayes, superintendent; M. L. Thompson, assistant superintendent. 41 miles, 12-in., lateral, Delhi to Lake Providence, La.; headquarters, Lake Providence; E. C. Norris, general superintendent; R. E. Thornton, superintendent. Section 3-A, Mayersville to Oakland, Miss., Associated Pipe Line Contractors, Inc.; J. A. Williams and L. H. Gray, spreadmen; Section 3-B, 4-A, Oakland, Miss., to Henderson, Tenn., Eastern Construction Co.; Section 4-B, 5-A, Henderson to Clarksville, Tenn., Eastern Construction Co.; Section 5-B, 6-A, Clarksville, Tenn., to Elizabethtown, Ky., field office, Clarksville, Tenn., Fred L. Byers, superintendent; Britton Construction Co.; Section 6-B, 111 miles of 22-in., Elizabethtown to Hebron, Ky., H. L. Gentry Construction Co., Frank Morris and Jim Mitchell, spreadmen; Section 7 South, Hebron, Ky., to Eaton, Ohio, Britton Construction Co., field office, Hamilton, Ohio; spreadman, Fred Peters; Section 7 North, Eaton to Lima, Ohio; Section 8, Magnolia, Ark., to Haynesville, La. Longview, Tex.-Haynesville, La., section, 110 miles 20-in., contracted to O. R. Burden Construction Co.

Cumberland and Tennessee rivers, Eastern Construction Co.; field office, Clarksville, Tenn., Fred L. Byers, spreadman.

Naph-Sol Refining Co.—25 miles 6-in., under construction, Kimball Lake oil field, Newaygo County, Michigan, to refinery at Muskegon; Young Construction Co., Olney, Ill., contractor.

Phillips Petroleum Co.—45 miles 2-24-in., gathering system near Andrews, Tex.; Vaughn & Taylor Construction Co., contractor; Jess Moore in charge.

Pasotex Pipe Line Co.—32 miles 4-8-in., authorized, North Snyder, Tex., lines for gathering, delivery to Basin System.

Portland Pipe Line Co., Montreal Pipe Line Co., Ltd.—236 miles, 18-in., planned, Portland, Me., to Montreal, Que., Canada, contracted as follows: Oklahoma Contracting Co., 85 miles in Section 1 at southern end; Portland, Me., to Gorham, N. H. Associated Pipeline Contractors, Inc., Section 2, 81 miles; and Fred Mannix Co., Ltd., 68 miles, Section 3, in Canada.

Richfield Oil Corp.—40 miles, 10-in., Cuyama Valley-Newhall, Calif., planned; Bechtel Corp., contractor; central plant, Watson, Calif., 60 miles, 14-in., applying field joints, Newhall-Wilmington, Calif.; under way; Bechtel Corp., contractor.

Texas-Empire Pipe Line Co.—42 miles, 16-in., authorized, Wilmington, Ill., to East Chicago, Ind.; O. E. Burden Construction Co., contractor.

Products Pipe Lines—Domestic

Great Lakes Pipe Line Co.—261 miles, 12-in., under way; contracted as follows: 52 miles, 15-in., Albert Lea to Fairbault, Minn.; under construction; Sheehan Pipe Line Construction Co., contractor; field office, Albert Lea, Minn.; C. W. Henderson, spreadman. O. R. Burden Construction Co., 64 miles north from Des Moines; field office, Nevada, Iowa; G. D. Lewis, spreadman; A. C. Holder Construction Co., 72 miles to Iowa-Minnesota state line; Williams Brothers Corp., 20 miles, Mississippi River crossing and line to terminal and station. Kansas and Missouri river crossings, R. H. Fulton & Co.; field office, Kansas City; Ed Veach, spreadman.

290 miles, 12-in., Tulsa to Kansas City, Mo. Contracted as follows, for completion March 1: 54 miles, Ponca City to Barnsdall, Okla., O. R. Borden Construction Co.; and 236 miles, Barnsdall, Okla.-Kansas City, Mo., Pacific Pipe Line & Engineers, Ltd. James Howe, superintendent for Pacific Pipe Line portion is headquartered at Chanute, Kans.; spread office at Tulsa with Ham Hamilton general spreadman and river-crossing spreadman; spread office at Dewey, Okla., Loue Robertson, spreadman; and spread office at Paola, Kans., Larry Webb, spreadman.

355 miles, 12-in., authorized, Kansas City through Omaha and Sioux City, Iowa, to Sioux Falls, S. D.

189 miles, 12-in., authorized, Kansas City to Des Moines.

50 miles, 8-in., authorized, Cushing-Drumright-Tulsa, Okla.

Phillips Petroleum Co.—155 miles 6-in., extension to present 200-mile line from Phillips, Tex., to LaJunta, Colo., on to Denver.

Standard Oil Co. (Ohio).—38 miles 8-in., authorized, Toledo to Fostoria, Ohio.

Salt Lake Pipe Line Co.—242 miles, 6-8-in., Boise, Idaho-Pasco, Wash., planned. Contracted as follows: Morrison-Knudson Co., Inc., Macco Corp., and Bechtel Corp., section from Boise to Baker, Idaho; Pacific Pipeline & Engineers, Ltd., Baker to Pasco, Wash.

Natural-Gas Pipe Lines—Domestic

Alabama-Tennessee Natural Gas Co.—80 miles 10-in., under way, Selmer, Tenn., to Muscle Shoals, Ala.; 35 miles 8-in., authorized, Muscle Shoals to Decatur, Ala.

Algonquin Gas Transmission Co.—276 miles, Lambertville, N. J., to Boston area, proposed.

492 miles laterals, New England area, proposed.

Atlantic Gulf Gas Co. (United Gas Pipe Line Co.)—1,530 miles, planned, Alabama-Florida-Georgia-South Carolina.

Central Hudson Gas & Electric Corp.—40 miles, authorized, Tuxedo, N. Y., station. Home Gas Co. line now under construction, to Poughkeepsie, N. Y.

Central Kentucky Natural Gas Co.—36 miles, 12-20-in., planned, Kentucky loops.

Chicago District Pipe Line Co.—41 miles, 24-in., planned, Joliet, Ill., to Chicago.

City of Indianapolis, Ind., Inc.—55 miles 16-in., proposed, Indianapolis to Texas Eastern Transmission Corp.'s system.

Cities Service Gas Co.—47 miles, 3-4-16-in. planned, in Kansas.

Coastal Pipe Line Co.—1,000 miles, planned, Texas to Norfolk, Va.

Colorado-Wyoming Gas Co.—41 miles,

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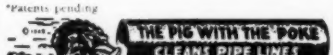

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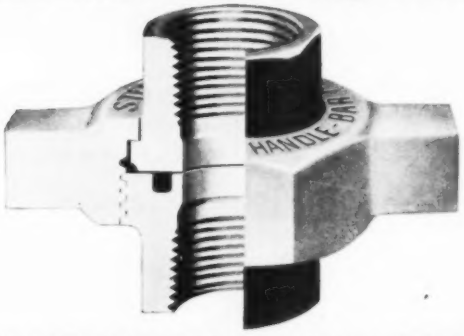

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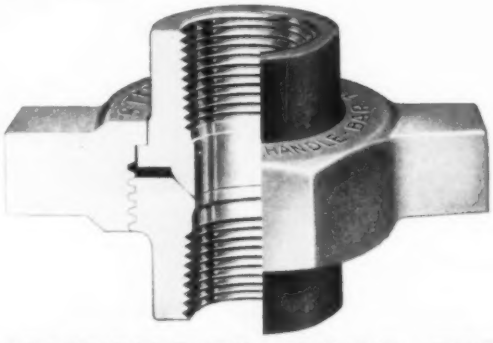

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planned, Greeley, LaSalle, and Windsor, Colo., areas.

Commonwealth Natural Gas Corp.—537 miles, 20-in., planned, West Bend, Ky., to Norfolk, Va.

200 miles, planned, Green County, Virginia, to Norfolk.

East Tennessee Natural Gas Co.—185 miles, 16-in., Lobelville-Chattanooga, Tenn., contracted by Walters & Saigh Construction Co., for construction in 1950; 120 miles, 12-in., Chatanooga-Knoxville, Tenn.; contracted by Walter and Saigh Construction Co., for construction in 1950; 100 miles of laterals to be laid in 1950. Construction 150 miles, 16-in., Knoxville-Bristol, Tenn., under consideration.

El Paso Natural Gas Co.—All work done by company crews.

Looping of 26-in., New Mexico-California line and connection with Pacific Gas & Electric Co. at Needles, Calif. 352 miles, 30-in., completion November 1950.

450 miles, 30-in., under construction, Eunice, N. M.-Blythe, Calif., looping; completion March 1950.

450 miles, 24-in., planned, San Juan basin, New Mexico to Franconia, Ariz.

Home Gas Co.—70 miles, planned, Orange, Sullivan-Rockland counties, New York-Cattaraugus County, New York, areas.

Jersey Central Power & Light Co.—39.4 miles, 10-in., planned, New Jersey to Coast system, Texas Eastern Transmission Co.'s Big Inch.

Michigan-Wisconsin Gas Co.—185 miles, 4-14-in. laterals, Milwaukee-Fond du Lac, Sheboygan, and Green Bay, Wis., under construction; C. C. Griffis Construction Co., contractor; Paul Means, superintendent for Lake Del Mort crossing.

Montana-Dakota Utilities Co. and Montana-Wyoming Gas Pipe Line Co.—340 miles, 12¾-in., planned, Worland, Wyo., to Cabin Creek, Mont.; R. A. Conyes Construction Corp., contractor; Al Poggi, general superintendent; Chester Kincaid and Jimmy Alman, spreadmen.

Montana Power Co.—83 miles, 12¾-in., planned, Butte to Bozeman, Mont.

New York State Natural Gas Corp.—53½ miles 16-in., loops, Pennsylvania.

Northeastern Gas Transmission Co.—511 miles, up to 20-in., planned, in New England area.

Northern Natural Gas Co.—41 miles, 20-in., under construction, Southwest from Garden City, Kans.; R. H. Fulton & Co., contractor.

597 miles of looping in 10 sections, contracted as follows: R. H. Fulton & Co., loops 1 to 5: loop 1, 40.2 miles, 26-in., extending northward from a point 28.7 miles north of Skellytown station in Pampa, Tex., area; loop 2, Beaver, Okla., station, 74.9 miles, 26-in.; loop 3, Mullinville, Kans., station, 33¼ miles, 26-in.; loop 4, Bushton, Kans., station, 72½ miles, 26-in., loop 5, from a point west fo Garden City, Kans., to Bushton, Kans., station, 155 miles, 20-in. Midwestern Constructors, Inc., loops 6 and 7; loop 6, from a point 29 miles northeast of Palmyra, Nebr., station, 43.4 miles, 26-in., to Oakland, Iowa, station; loop 7, from a point 17.8 miles northeast of Oakland, Iowa, station, 65.9 miles, 26-in. R. B. Potashnick, loops 8 to 10: loop 8, southwestward from Ventura, Iowa, station, 31.2 miles, 26-in.; loop 9, northward from Ventura station, 41 miles, 26-in.; loop 10, from the north end of a 26-mile gap beyond loop 9, where another loop will be built consisting of 39½ miles, 26-in.

Northwest Natural Gas Co.—750 miles planned; Washington, Oregon, and Idaho.

Pacific Gas & Electric Co.—506 miles, 34-in., under construction, Topock, Ariz.-Milpitas, Calif.; Bechtel-Price-Conyes, contractor; spread office; R. L. Bowman, general superintendent.

Panhandle Eastern Pipe Line Co.—358 miles, 26-in., authorized, looping in Texas, Oklahoma, Kansas, Missouri, Illinois, Indiana, Ohio, and Michigan.

Peoples Gas Light & Coke Co.—Planned 42 miles, 24-in., Joliet-Chicago, Ill.

Phillips Petroleum Co.—25 miles gathering system in West Edmond, Okla., field; under construction; Vaughn & Taylor Con-

Vitron*

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WRITE FOR BULLETIN NO. V-69

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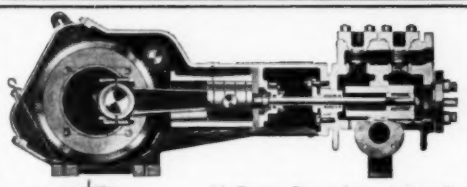
McGOWAN *Dependable* PUMPS



McGowan Power frame is heavily ribbed iron casting; liquid end is made from fine grained, controlled cast iron. Gears are continuous tooth herringbone. Pinion is forged integral with the shaft, which extends to both sides for connection to driver.

Pinion shaft floats on double row Timken roller bearings while crank shaft also turns in Timken roller bearings. Crank bearings are adjustable by means of shims. Cap does not support the weight of bearings, crankshaft and gear, as these are supported in separate housing, made larger for easy insertion of moving parts. Consequently pump is easily dismanteled. Liquid piston rod is removed from back of crosshead by removing piston rod cover and stuffing box in power frame.

Liquid end is duplex side pot type with suction on either side. Valve areas are ample and pot caps are sealed with metal covered gaskets. Liners are removable.

McGOWAN PUMPS

LEYMAN MANUFACTURING CORP.
The JOHN H. McGOWAN Co. DIVISION
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struction Co., Inc., contractor; spread office Edmond, Okla.

Piedmont Natural Gas Corp.—1,350 miles 20-in., planned, Greenville, Miss., to Norfolk, Va.

Plains Natural Gas Co.—78 miles, gathering system, Oklahoma-Kansas area, Hugoton field. Contracted by: Arey-Phillips Construction Co., Amarillo, Tex.; Tulsa Pipe Coating Co., Mid-Western Constructors, Inc., Engineering and supervision. Latter firm represented by Lyle DeWitt.

Roanoke Pipe Line Co.—30 miles 8-in., Gala, Va., to Roanoke, authorized.

South Jersey Gas Co.—77 miles, planned Camden to Atlantic City.

Southern California Gas Co.—80 miles 30-in., Whitewater to Puente, Calif., planned.

Southern Natural Gas Co.—138 miles, 20-22-in., planned, Chattanooga, Tenn., to Lexington, Miss.

375 miles, 24-in., planned, Gwinville, Miss. to Atlanta.

225 miles, 16-in., planned, Colfax, Ga., extension.

110 miles, 11-in., considered; extension

314 miles, 18-in., planned; extension.

171 miles, 16-in., planned; extension.

118 miles, 13-in., planned; extension.

Southern Union Gas Co.—78 miles, 8-10-14-in., planned, New Mexico loops and laterals.

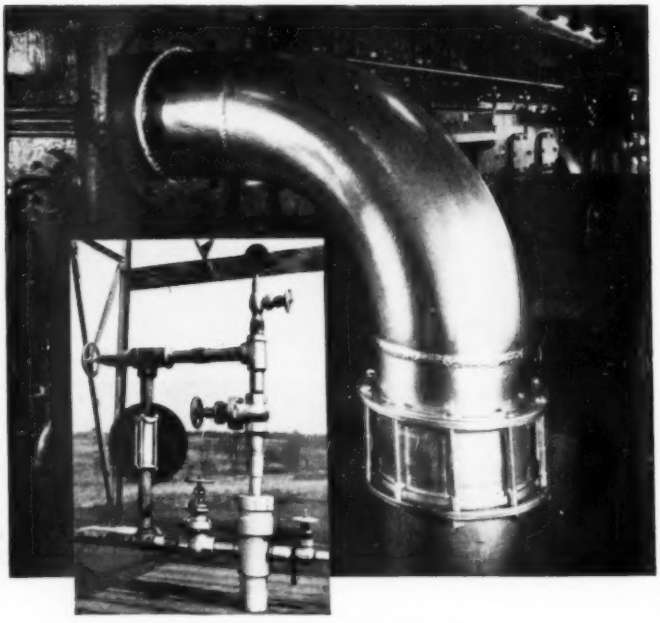
Tennessee Gas Transmission Co.—65 miles 16-in., planned, Ohio-Pittsburgh spur.

790 miles, 20-26-in., planned, Burnaugh, Ky., to Boston, including 400-mile line to Buffalo.

592 miles, 30-in., planned, first 150 miles of loops to be laid at Monroe, La., Greenville, Miss., Midland and Portland, Tenn.

54.2 miles, 30-in., under construction White Bluff area to Joelton, Tenn., area contracted to Morrison Construction Co.

36.1 miles, 30-in., under construction Glasgow, Ky., area to Joelton area, contracted to Morrison Construction Co.



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18.1 miles, 30-in., under construction Union City to Buckeye, Ky., Anderson Brothers Corp., contractors.

27.7 miles, 12-in., under construction, El Campo, Tex., to near Traitor, Tex.; Massey Construction Co., contractor.

25 miles, 30-in., Hardeman and McNairy counties, Tennessee; H. C. Price Co.; field office, Selmer, Tenn.; J. A. Reutzel, spreadman.

70 miles, 26-30-in., between stations 104 and 110; Anderson Brothers Corp.; field office, Richmond, Ky.; E. C. McCoy and Arkie Hobson, spreadmen.

170 miles of 26 and 30-in., contracted by Anderson Brothers Corp., in Kentucky.

Texas-Eastern Transmission Corp.—1,400 miles planned, Texas to Pittsburgh loops.

108 miles 16-in., authorized, Provident City to Baytown, Tex.

Texas Gas Transmission Corp.—103 miles, 20-in., Carthage, Tex., to near Lisbon, La., (Sharon); under construction; N. A. Saigh Co., Inc., contractor; Carthage, Tex.; Bob Floyd, representative. Construction subcontracted: (1) Fowler Brothers, 43 miles from Carthage to Red River, field office at Carthage; M. C. Johnson, spreadman; (2) 63 miles to Sharon station, Oklahoma Contracting Co. (J. R. Horrigan) field office at Minden, La.; Ed Flanagan, spreadman.

32 miles, planned, Slaughters, Ky., to Evansville, Ind.

Texas Illinois Natural Gas Pipeline Co.—1,400 miles, 30-in., planned, La Gloria field, Texas, to Joliet, Ill.

58-mile, 20-in. lateral, Joliet terminal to connection with Natural Gas Pipeline Co. of America near Volo, Ill.

Transcontinental Gas Pipe Line Co.—Texas-New York 1,840 miles, 30-in., main line and 500 miles, 4 to 22-in., gathering line. Section of 605 miles of 30-in. nearing completion.

Section (unnumbered), Rio Grande Valley to Eunice, La., 502 miles; contracts not let. Section 6, Newman, Ga., to Danielsville, Ga., 108 miles; Williams Brothers Co.; field office, Monroe, Ga.; Thelmer Davis, spreadman. Section 7, Danielsville, Ga., to Saluda River, South Carolina; 86 miles; Williams Brothers Co. Section 8, Saluda River, South Carolina, to Catawba River, North Carolina, 102 miles; R. H. Fulton & Co. Section 9, Catawba River, North Carolina, to North Carolina-Virginia boundary, 100 miles; R. H. Fulton & Co.; A. A. Corrigan, superintendent; Clark Williams, general superintendent. Section 10, North Carolina-Virginia boundary to James River, Virginia; 86 miles; O. R. Smith Contracting Corp. Section 11, James River, Virginia, to Potomac River, Virginia; 110 miles; O. R. Smith Contracting Corp. Section 12, Potomac River, Virginia, to Susquehanna River, Pennsylvania, 76 miles; Associated Engineers & Contractors, Inc. Section 13, Susquehanna, Pennsylvania, to Delaware River, 90 miles; Wunderlich & Griffis Construction Co. Section 14, Delaware River to Hackensack River, New Jersey, 61 miles; Wunderlich & Griffis Construction Co. Section (unnumbered), Hackensack River, New Jersey, to Hudson River, New York, 23 miles; Oklahoma Contracting Co.; field office, Edgewater, N. J.; M. E. Shiflett, spreadman.

Trunkline Gas Supply Co.—1,775 miles, 10-26-in., planned; includes 740-mile, 26-in. main line from Lake Charles, La., to Tuscola compressor station on Panhandle Eastern Pipe Line Co., and 1,035 miles, 10-24-in. Lake Charles, La., to McAllen, Tex., field lines, pending FPC approval of changed plans.

United Fuel Gas Co.—32 miles, 20-in., authorized; Roane, Calhoun, and Wetzel counties, West Virginia.

United Gas Pipe Line Co.—90 miles, 16-in., planned, West Bay field to New Orleans.

105.6 miles, 20-in., authorized, loop line paralleling Carthage, Tex.-Sterlington, La., and extending on to near Monroe, La.

26 miles in Louisiana conecting with East Texas system, planned.

United Natural Gas Co.—29 miles, 12-in.,

authorized, laterals, Elk County, Pennsylvania.

Virginia Natural Gas Co.—153 miles, planned, Buckingham to Richmond and Portsmouth, Va.

Crude-Oil Pipe Lines—Foreign

Interprovincial Pipe Line Co. (Imperial)—1,150 miles, 16-20-in., Edmonton area, to Superior, Wis.; contracted as follows: 480 miles, 20-in., Edmonton-Regina, Canadian-Bechtel, Ltd., associated with Fred Mannix Co., Calgary, Alta.; 340 miles, 16-in., Regina to Gretna, Man., Williams Brothers Corp.; 360 miles, 18-in., Minnesota and Wisconsin, Anderson Brothers Corp. (Lake Head Pipe Line Co., Inc.).

Iraq Petroleum Co., Ltd.—620 miles, 16-in., Kirkuk-Haifa, Palestine, shut down.
556 miles, 30-32-in., planned, Kirkuk, Iraq-Banias, Lakatia (Bechtel).

Middle East Pipe Line Co.—800 miles, 34-36-in., planned, Iran-Levantine Port.

Montreal Pipe Line Co., Ltd.—(See Portland Pipe Line Co. item in domestic crude oil list.)

Petroleos Mexicanos—280 miles, 12¾-in., authorized, Poza Rica to Salamanca, Mexico.

Santos Jundial Railroad—30 miles, 18-in., planned, Santos to Sao Paulo, Brazil.

Trans-Arabian Pipe Line Co.—1,067 miles, 30-31-in., under construction, Abqaiq, Saudi Arabia, to Sidon, Lebanon; International Bechtel, Inc., Williams Brothers Corp., Graver Tank & Mfg. Co., and Chicago Bridge & Iron Co., contractors.

Yacimientos Petroliferos Fiscales de Argentina.—25 miles, under way, Tupungato-Lujan de Cuyo.
409 miles, under way, Plaza Huincul-Bahia Blanca.

Products Pipe Lines—Foreign

Petroleos Mexicanos.—160 miles, 10¾-in., authorized, Minatitlan to Salina Cruz, Mexico.

Cia. des Pipe Lines Petroliers Francias.—150 miles, 10-in., planned, Le Havre to Paris, France.

Colombian Government.—268 miles, planned, Puerto Berrio to La Dorada, 90 miles; Puerto Berrio to Medellin, 103 miles; Buena Ventura to Cali, 75 miles.

Northern Pipe Line, Ltd.—300 miles, 10-in., planned, Montreal to Toronto, Canada.

Santos Jundial Railroad.—40 miles, 10-in., planned, Santos to Sao Paulo to Campinas, Brazil.

Natural-Gas Pipe Lines—Foreign

Direccion General del Gas del Estado.—310 miles, planned, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.
62 miles, Comodoro Rivadavia to Caleto Olivia, under way.

Northwest Natural Gas Co.—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Petroleos Mexicanos.—205 miles, 16-in., considered, Monterrey to Torreon, Mexico.
260 miles, 20-in., considered, Monterrey-Tampico-Poza Rica area, Mexico.

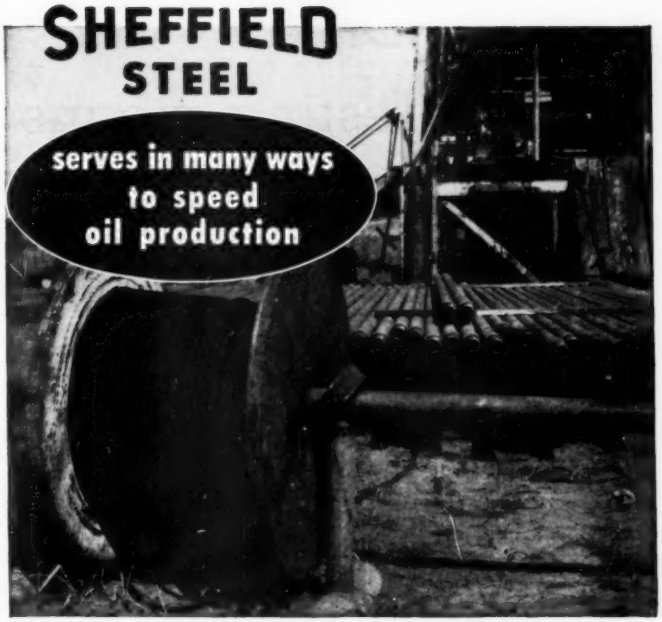
Petroleos Mexicanos, Mexican Gas Co., and Industrial Gas Co.—600 miles, planned, Reynosa, Tamaulipas to Mexico City, D. F., Mexico.

Westcoast Transmission Co., Ltd.—1,406 miles, 30-in., planned, North Alberta, Vancouver, B. C., and northern California.

Western Pipe Lines.—710 miles, 22-24-in., planned, Alberta fields, Saskatoon, Alta., to Winnipeg, Man., Canada.

Theck & Cross Change Name

Theck & Cross Drilling Co., Inc., with offices at 711 Mercantile Securities Building, Dallas, has changed its name to Empire Drilling Co. The same offices will be maintained.



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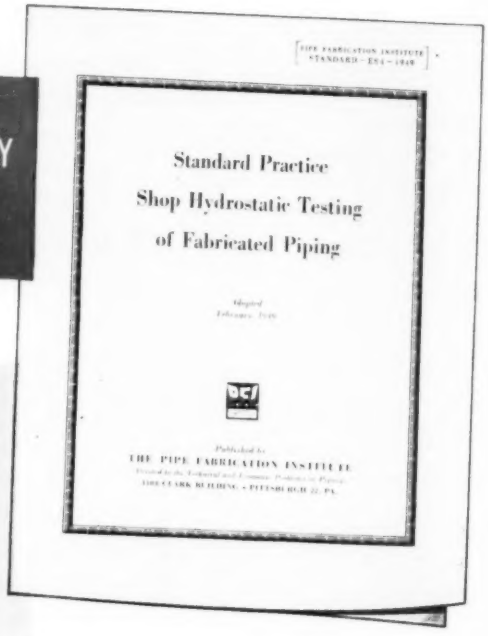

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REFINING

I.R.A.A. Says It Supports Industry's Depletion Fight

The Independent Refiners Association of America in a statement released by its executive committee, announced last week that it would support the industry's fight to retain the present depletion allowance.

"For over 12 months the independent refiner has seen what poor economic health can mean," the statement read, "and the I.R.A.A. opposes any downward revision of the existing depletion allowance feeling that it would frustrate the efforts of the producing and exploration segments of the petroleum industry to the same extent."

The executive committee, headed by Harry Leyendecker, Eastern Petroleum Co., Houston, includes M. Lloyd Freese, Bell Oil & Gas Co., Tulsa, and Fred C. Koch, Wood River Oil & Refining Co., Wichita.

"It is exiomatic that the maintenance of an adequate supply of petroleum is essential to a healthy economy in this nation," the statement continued. "The petroleum industry furnishes a sufficient supply for peacetime operations as well as developing a reserve capacity for national defense, and has supplied the necessary quantity to fight the last two World Wars. One of the contributing factors supporting this record was the depletion allowance agreed to by the Government and industry, and it would be a poor policy to tamper with a proved and successful system."

The Independent Refiners Association of America was organized in November 1949.

Clean Oil and Wax Can Be Made from Petroleum Waste

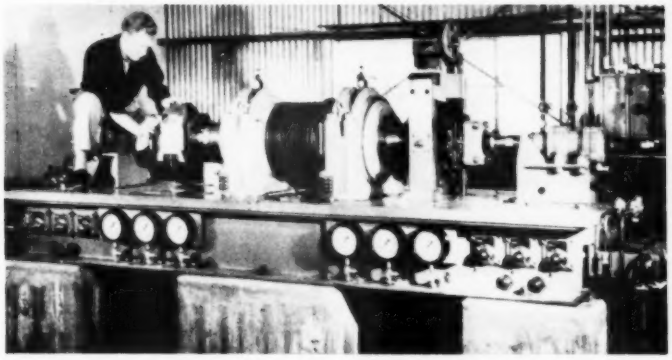
A process to salvage valuable oil and wax from the "settlings" or waste material in the bottom of petroleum-storage tanks, and in earthen pits has been developed by the U. S. Bureau of Mines, and successfully tested in a pilot plant.

From 2,000 bbl. of pit-waste emulsion containing water and dirt, among other things, the research chemists recovered about 600 bbl. of clean oil. This oil contained 15 to 18 per cent of microcrystalline wax, used in coating food packages, paper milk cartons, and other products. This type of wax will stand more heat without melting than regular paraffin wax.

Laboratory tests and analyses are described in the bureau report, prepared by J. W. Horne and J. Wade Watkins, bureau chemists, along with demulsification reactions, physical characteristics, recovered oils, and waxes. Microphotographs in color show various steps in recovering oil and wax, and pilot-plant methods and other operations are illustrated in the report.

Copies of the publication, Technical

TEXACO BUILDS RAILROAD BEARING LUBRICANT TESTER



A machine for testing railroad-car journal-box bearing lubricants has been developed at the Beacon, N. Y., laboratories of The Texas Co. Weighing 7 tons, the tester simulates actual operating conditions for railway-car bearings, and will handle loads up to 50,000 lb. It permits studies of bearing lubrication under shock loading conditions which were previously impossible in the laboratory. The apparatus will handle both plain and roller bearings, and simulates car speeds up to more than 100 m.p.h.

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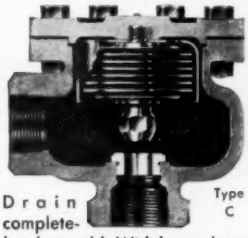

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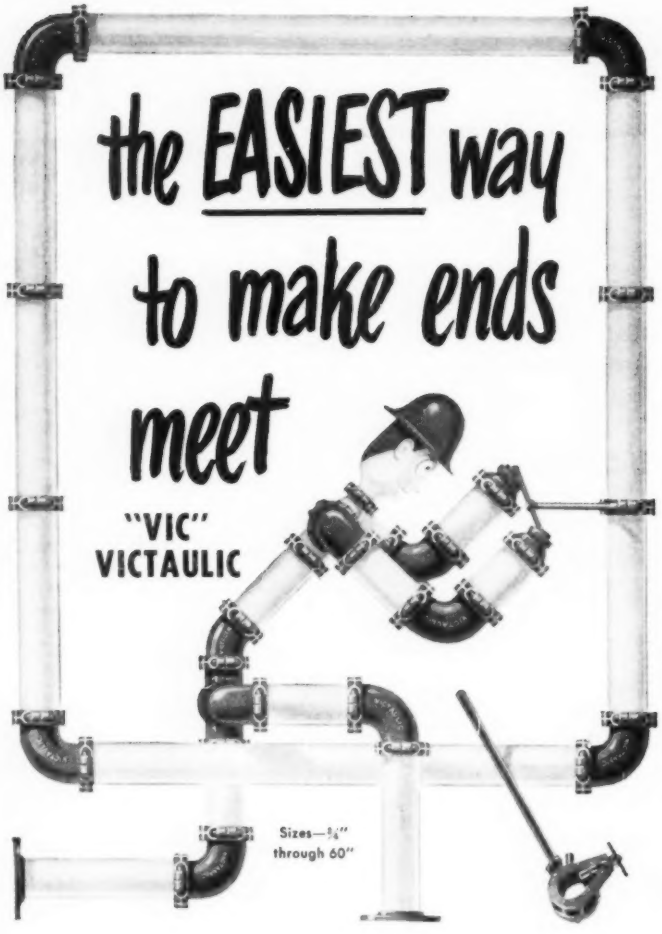

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26TH VICTAULIC YEAR

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Paper 715, "A Method of Resolving Oilfield-Waste Emulsions," may be obtained for 50 cents each from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

New Fractionating-Tower Packing Announced by Firm

A new industrial fractionating-tower packing, Panapak, has been announced for commercial application by Pan American Refining Co. The Marshall-Moorman Development Co., New York City, has been appointed technical and licensing agent for the new-type packing.

Invented by R. C. Scofield, the packing comprises multiple layers of expanded metal lath, corrugated into parallel ridges and valleys measuring roughly 7½ in. ridge-to-ridge. These layers are placed in the tower with valleys of each corrugated "tray" touching the peaks of each underlying tray, forming a honeycomb pattern in vertical cross section at right angles to the corrugations.

Chief advantages of new packing are high capacity and high efficiency, according to L. W. Moore, president of Pan American. It provides a two-fold increase in capacity compared with bubble-cap towers, together with considerable increase in efficiency, he said.

Oil Heat Institute Plans Convention April 24-28

Plans are being formulated for the twenty-seventh annual convention of the Oil Heat Institute of America, which will be held in Philadelphia April 24-28. Held in conjunction with the National Oil Heat Exposition, the convention will be devoted to manufacture and distributor problems.

Convention sessions and business meetings will be held at the Benjamin Franklin Hotel.

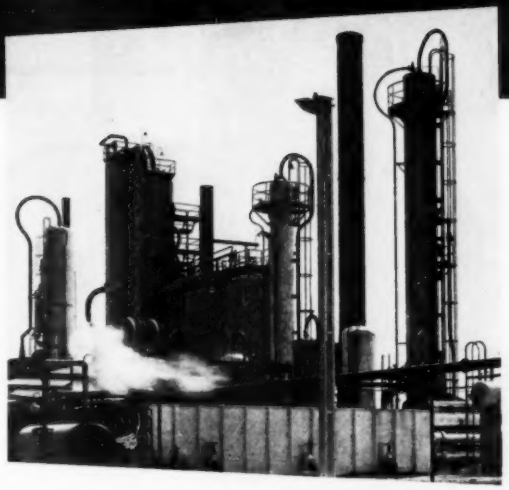
Among the outstanding problems to be discussed by the oil-burner industry attendants will be the rising competition of natural gas.

New Launching Grease Is Developed by Socony

A base-coat launching grease, the result of years of research and experiment, has been developed by Socony-Vacuum Oil Co., Inc., and has already been proved successful in sending new 28,000-ton tankers down the ways.

Twenty days before the launching, the grease, which carries the ship's load, is melted and poured on the ways ⅜-in. thick, and ironed smooth. In addition to the base coat, a slip coat is applied ⅜-in. thick 24 to 48 hours before launching time.

Control Scale and Corrosion



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WEB WILSON *tongs*

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- New, improved hanger—more clearance for large kelly bushings.
- Finger guard on latch.
- 27 less parts than any other tong—lower initial cost.
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- More economical.

Field-Proven

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Among the

Drilling Contractors

Godfrey, Ewert Named to Head A.A.O.D.C. Committee

F. E. Godfrey, Big Chief Drilling Co., and W. R. Ewert, Kerr-McGee Oil Industries, Inc., have been appointed chairman and cochairman, respectively, of the accounting committee of the Central Oklahoma chapter, American Association of Oilwell Drilling Contractors.

The two will also head up studies of industry accounting problems within the Central Oklahoma area.

Drilling Activity Shows an Increase Over Last Week

A total of 1,970 rotary rigs were in operation in the United States and western Canada at the close of the week ended February 13, compared with 1,948 the same period a year ago. This increase of 22 rigs appears to be following the pattern set last year, when operations dipped during January, but began climbing in early February.

Although operations have fallen off during this year, total number of rigs in operation has not fallen as low, correspondingly, as the total during the same 1949 period.

A total of 1,897 rigs were running in the United States on February 13, an increase of 12. However, this is 76 less rigs than were running on the corresponding date in 1949.

Ten more rigs were running in western Canada than a week ago, as the following table shows:

ROTARY RIGS IN OPERATION*
(United States and Western Canada)

Area—	Week ended 2-13-50	Change from week ended 2-6-50	Change from week ended 2-14-49
Gulf Coast	480	—11	— 92
W. Tex.-N. M.	683	— 2	+159
Ark.-N. La.-E. Tex.	153	+ 5	— 26
Oklahoma	237	+ 9	+ 22
Kansas	101	+ 7	+ 12
Illinois-Eastern	33	— 1	— 67
Rocky Mountains	64	+ 2	— 39
Pacific Coast	140	+ 1	— 50
Total United States	1,897	+12	— 76
Western Canada	73	+10	+ 11
Total	1,970	+22	—165

*Courtesy Hughes Tool Co.

A.A.O.D.C. Pledges Fight to Keep Depletion Allowances

Top officials of the American Association of Oilwell Drilling Contractors meeting with the Tulsa chapter of the association in Tulsa last week pledged complete support of A.A.O.D.C. membership to a fight for retention of the present 27½ per cent tax-depletion allowance.

Warren S. Churchill, president of Arrow Drilling Co., Tulsa and Dallas,

Shown on the derrick floor with one of his drilling crews of a rig now running for Thomas C. Berry near Yale in northeastern Payne County, Oklahoma, is W. C. Patton (left), drilling contractor, Stillwater, Okla. Crew members, left to right, are: G. E. Powers, driller; G. A. Pollard, R. W. Myers, and B. J. Watts.

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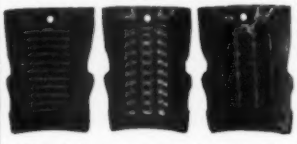

"Varco" buttons, popular for years in rotary drill pipe slips, proved satisfactory and have been adopted and are installed in segments of automatic casing spiders and elevators of various makes. Wickers are removed and holes bored for a maximum number of VARCO casing buttons, to assure uniform and maximum gripping area. Converting buttons for the next smaller casings are available. Write for complete descriptive data.

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418 S.E. 29th St., Oklahoma City 9
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P. O. Box 748, Odessa, Texas

and head of A.A.O.D.C., said he has directed Ira J. Van Tuyle, V-T Drilling Co., Evansville, Ind., to go to Washington to support other oil leaders in the final sessions before the House tax group.

Brad Mills, executive vice president of A.A.O.D.C., said that reduction of the tax depletion "would hinder the work of the contractor, and in many areas it would make it impossible for him to continue in business."

B. E. Groenewold, Exploration Drilling Co., Tulsa, chairman of the Tulsa section, served as toastmaster assisted by A. F. Keating, Keating Drilling Co., vice president, and Robert Parker, of Parker Drilling Co., chapter secretary.

Quaker Drilling Co. is drilling a well for Alpine Oil & Royalty and North American Producing Co. northeast of the Bryant field in Barton County, Kansas. The test is the 1 Miller, NW SW SE 23-20s-12w.

Fields & Randel was awarded contract to drill a test 17 miles southeast of Perry in Taylor County, Florida, for Gulf Refining Co. The test, 1 Brooks-Scanlon, is on Block 37 of Section 17-6s-9e.

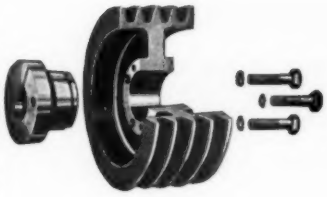
Ben F. Brack Drilling Co. has operations under way for Robert L. Williams et al., at 1 Hunt-Simpson, in Sumner County, Kansas. The venture is 3 miles northeast of the Wellington field, on a block of 2,000 acres, in SE NE SW 2-31s-1w.

H-R-H Drilling Co. has contract for a wildcat venture on a 286-acre tract in the John Johnson Survey No. 45, Coleman County, Texas. The test is Harry L. Todd of Dallas, 1 Taylor Motor Co. Contractor is using cable-tool rig.

Creighton Drilling Co. is rigging up rotary tools for a 4,400-ft. Bartlesville sand test, 1 Ross, NE NE SE 22-18n-2e, near the Southeast Ramsey pool of Payne County, Oklahoma, for F. A. Kerr, W. J. Marten, Herman Kaiser and Francis Oil & Gas Co., Inc. J. E. Crosbie, Inc., Sun Oil Co., Mid-Continent Petroleum Corp., and Atlantic Refining Co., are contributing toward the operation.

Redwing Drilling Co.'s latest contract is for a wildcat test to be drilled in Jasper County, Mississippi, for Rip Ray and J. S. Rose. The test will be 1 Masonite and is located in 8-4n-11e, southeast of Roberts.

Northern Development Co., Edmonton, is moving a rig to the Pouce Coupe area in northeastern British Columbia, Canada, where it will drill an exploratory test for Phillips Petroleum Co. The loocation is near Sunset Prairie in LSD 16, 22-78n-18w6.



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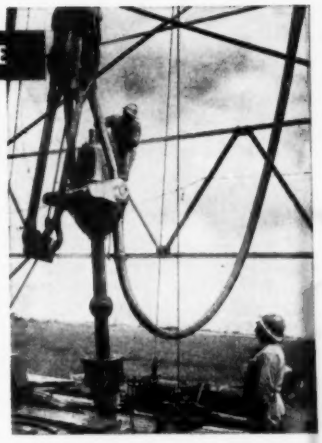

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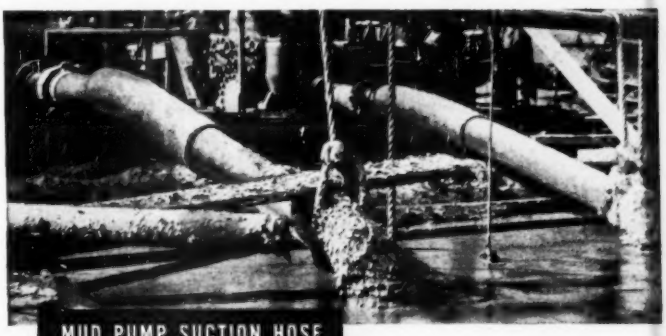

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Best way to cut suction costs is to let Hewitt-Robins help! With Hewitt Mud Pump Suction Hose you prevent hose collapse and kinking because the carcass is reinforced with spiraled spring steel wiring. Built-in, clampless nipples are permanently sealed in the hose—and over everything is a rugged cover that's tougher than all the abuse it will ever get!

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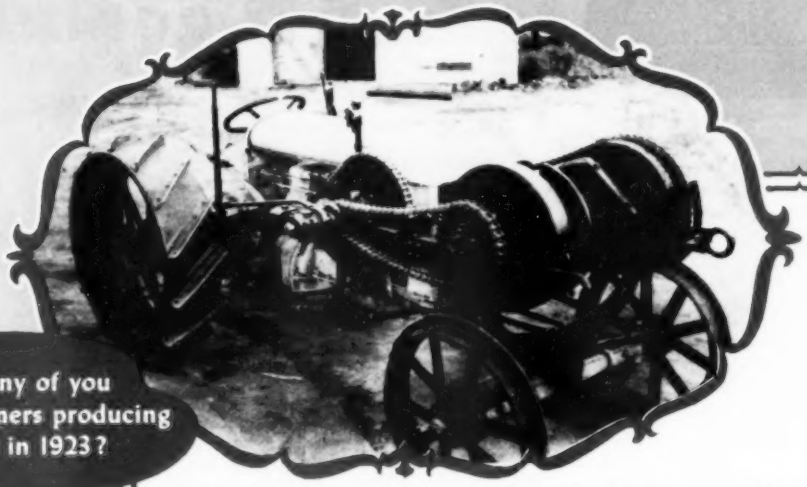
THE FIRST WILSON WINCH?



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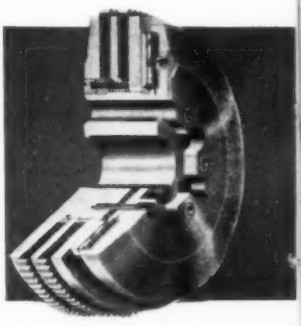

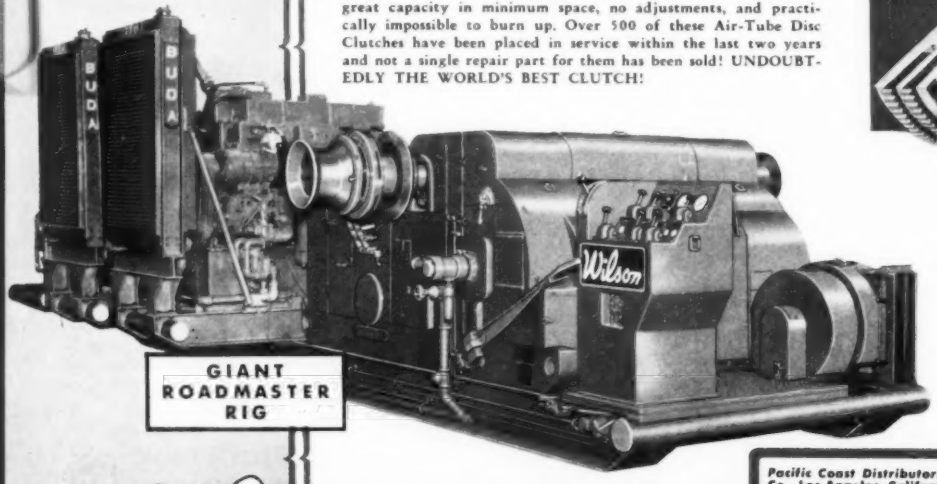

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NATURAL GAS

Construction Started at New Gas-Treating Plant

Construction has started on El Paso Natural Gas Co.'s new gas-compressor station and treating plant west of Phillips Petroleum Co.'s natural-gasoline plant north of Crene, Tex.

The plant will be built for a capacity of 15,000,000 cu. ft. of gas daily. Four 11,000-hp. compressors will be used to step pressures from 40 psi. to between 500 and 600 psi.

The plant will incorporate its own power-generating system to supply electricity for the plant and 13 residences which will be built northwest of the station.

In addition to the engine room, the plant will have treating facilities for removing hydrogen sulfide from the gas, which will enter El Paso's lines for shipments to points west, including California.

Jersey Central to Use Gas, Oil as Its Principal Fuel

Labor troubles in the coal fields have brought another utility customer to the petroleum industry.

Jersey Central Power & Light, Asbury Park, N. J., announced it had adopted a plan to use natural gas and oil to supplement coal as the principal fuels for its electrical generating stations. The company said the change was due to "the continued unrest in the coal industry."

Colorado Interstate Plans Merger With Amarillo Firm

Colorado Interstate Gas Co. has asked Federal Power Commission to authorize it to acquire all the natural-gas facilities of Canadian River Gas Co., Amarillo, Tex., and, contingent upon approval of the proposed merger, to construct a 175-mile transmission line which would carry additional gas to the Rocky Mountain market area.

The application, filed jointly by the two firms, said the merger is necessary to enable Colorado Interstate to secure an adequate financing base for the proposed pipe-line construction program, which is estimated to cost $8,645,000, plus an additional investment of approximately $3,583,000 in production and gathering facilities.

Under the proposed merger plan, Colorado Interstate will acquire all of Canadian River's outstanding common stock from Southwestern Development Co. As consideration, Southwestern will receive all the liquid hydrocarbons contained in the natural gas now owned by Canadian River in the West Panhandle field, and in other instances, marketing rights and a share of the proceeds in connection with the extraction and sale of other liquid hydrocarbons.

Canadian River's gas reserves are now in effect dedicated to Colorado, with the exception of certain sales contracts, under a 1928 contract. Canadian River's properties, located in Texas and New Mexico, consist of gas leases, gas estates, wells, gathering lines, compressor stations, and transmssion lines.

The 175-mile, 20-in. line which Colorado Interstate proposes to construct will extend from the West Panhandle (Texas) gas field to the company's Lakin, Kans., compressor station, and will deliver gas into the existing Lakin-to-Denver pipe line. Colorado Interstate said the line is necessary in order to serve the vastly expanded requirements of its resale customers in its Rocky Mountain area market. A 4,800-hp. compressor station would be built at the southern terminus of the line, and a gasoline plant and dehydration plant would be constructed on the discharge side of the projected compressor station.

Colorado Interstate hopes to complete the construction in time to have the facilities available for the 1950-1951 heating season.

Pennsylvania Companies' Rehearing Request Denied

Applications of Lancaster County Gas Co., Harrisburg Gas Co., Allentown-Bethlehem Gas Co., Consumers Gas Co., and Pennsylvania Public Utility Commission for rehearing of orders of last December 19 authorizing the four firms to construct pipeline facilities in eastern Pennsylvania have been denied by Federal Power Commission.

The firms and the Pennsylvania commission had asked for an opportunity to present new evidence in connection with FPC's determination that the companies will be subject to commission jurisdiction upon completion of the construction and commencement of operations of the proposed facilities.

FPC said that the applications for rehearing were substantially similar, each stating that by reason of the January 9, 1950 U. S. Supreme Court decision, Federal Power Commission vs. East Ohio Gas Co., et al., certain factors deemed important in that decision were not fully presented to the FPC for consideration.

The commission, however, found that "no new facts or principles of law have been assigned by the applicants which either were not fully considered by the commission prior to its orders herein, or having been considered warrant further hearing, modification, or revocation of said orders."

Alabama-Tennessee Tariff Proposal Rejected by FPC

A proposed natural-gas tariff, filed by Alabama-Tennessee Natural Gas Co., Florence, has been rejected by Federal Power Commission, and a hearing will begin April 4 in Washington, D. C.

Submitted by the firm to cover service through pipe-line facilities authorized by FPC in 1948, the proposed tariff was to become effective March 1, and was filed to satisfy a condition in the certificate granted to the company that the tariff be satisfactory to the commission. The pipe-line facilities will carry natural gas to markets in Alabama and Mississippi.

The tariff provides for a rate of $3 per 1,000 cu. ft. per month demand charge and 16.5 cents per 1,000 cu. ft. commodity charge for all natural gas sold by Alabama-Tennessee to distributing companies for resale.

At the hearing in connection with its application for authorization to construct the pipe-line facilities, Alabama-Tennessee submitted proposed rates which called for a $2 demand charge and a 12.3-cent commodity charge, FPC said. The commission also noted that the company purchases its entire natural-gas requirements from Tennessee Gas Transmission Co. at a rate consisting of a $1.85 demand charge and a 9.2-cent commodity charge.

In rejecting the proposed tariff, FPC found that if the company commences service to its resale customers prior to the April 4 hearing, it should file an interim rate schedule consistent with the rate proposed at the hearings on its certificate application, at least 10 days before it commences service.

Atlantic Hearing Postponed

Federal Power Commission has postponed until March 1 a hearing previously scheduled to commence February 20 in Washington, D. C., in the proceeding involving the suspension of Atlantic Seaboard Corp.'s proposed natural-gas tariff. The postponement was requested by Atlantic Seaboard.

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PRACTICAL for practically every drilling area! Our mud engineers will study your drilling mud problem . . . at no cost or obligation to you . . . and estimate in dollars the savings you can expect by using Driscose. Write for complete information.

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Exploration and Drilling

Scurry Reef Play Jumps Southwest

THE southwest end of the Scurry County Canyon reef play in West Texas is back in the limelight. Southeastern Borden County has two wildcats, one a new producer, and the other an unexpectedly low test, in the reef. These give geologists and operators both high hopes and headaches in trying to figure what is going to happen southwest of the Sharon Ridge Canyon production.

The successful strike, George P. Livermore, Inc., 1 Reinecke, SW NW Section 53, Block 25, H&TC Survey, in southeast Borden County, on drill-stem test flowed 24 bbl. of clean oil in 30 minutes, from a 30-ft. interval of Canyon reef pay at 6,754-84 ft. The low well, P. R. Rutherford 1 Griffin, NE NE Section 57, same block and survey, was reported to have finally found the top of the reef at 6,940 ft., almost 200 ft. below where some geologists had estimated the top might be. At this writing, it had not yet been proven a failure.

The Livermore strike is about 4½ miles south and slightly over 3 miles west of the nearest previous reef hit in Borden County, namely Amerada Petroleum Corp. 1 Von Roeder, SE SW Section 103, Block 25, H&TC Survey. *(See The Oil and Gas Journal, December 8, 1949, page 113).* The Von Roeder was finally completed with a potential rating of 185 bbl. of oil and 33 bbl. of water, through a 24/64-in. choke, from perforations at 7,100-10 ft.

The Von Roeder well is about 4 miles west of the nearest producers in the Sharon Ridge Canyon portion of the Scurry County reef. The Rutherford 1 Griffin lies 1¾ miles east and 1¼ miles north of the Livermore strike, and along a northeast trend between the Livermore and Amerada wells.

The reported reef tops for the three tests are: Amerada well —4,467 ft., Livermore well —4,406 ft., and Rutherford's test —4,618 ft. A little over 4 miles southwest of the Livermore strike, across the line in Howard County, Standard Oil Co. of Texas 1 Griffin, NW NW Section 35, Block 25, H&TC Survey, is below 8,800 ft., testing the Ellenburger, after missing the Canyon reef.

This new strike steps up the heat on various speculations and theories of geologists and operators. One theory is to take the nearest production in the Sharon Ridge Canyon area and project a straight southwest line about 10 miles to the Livermore test, considering Amerada's Von Roeder as an edge well on the north or northwest side of the trend. If the Griffin is dry, you hope it is merely in a sinuous twist in the reef trend.

It is nearly 40 miles as the crow flies, in a northeast direction from the Livermore well to the farthest north well in the Chapman Cogdell area of Kent County, just north of the Scurry County north line. Everything within the trend in that distance, that has not been condemned by dry holes, is potentially oil producing. Projections of the trend north and northeast from the Cogdell area, and south, west, or southwest from the Livermore lie in areas of soaring lease prices.

It matters little at this moment whether this trend is eventually going to be one continuous giant field, or a series of fields with dry spots in between. Our geological and geophysical tools are not sharp enough to forecast accurately. Only the drill will give the answer. We have already proved that this will be the third largest oil field ever found in the United States; it has excellent possibilities of passing the second largest (The South Texas Giant); it is still far short of East Texas and its 5 billion barrels.

Never in the history of the United States (perhaps of the world) has such a big oil field been recognized as such so early in its history. Less than 9 months after the first discovery we publicly proclaimed the possibilities that existed. *(See The Oil and Gas Journal, March 10, 1949, page 135).* That comes close to being the biggest trade-journal scoop in oil history. Today, just 2 weeks short of a year after that announcement, there are no more skeptics.

The stakes, however, are now so big that, unfortunately for us, no informed geologist cares to discuss for publication, even a speculation about further extensions of this trend. A mere hint of his line of thinking might be to his company's disadvantage and give its competitors an edge in the play. *Charles J. Deegan.*

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

TEXAS GULF COAST.—Deep Wilcox pay in Newton field, Newton County, has been opened by The Texas Co. 1 Newton County Lumber Co.-Derrough unit. On potential, through a 12/64-in. choke, the well flowed 140 bbl. of 44.4°-gravity oil daily through perforations at 10,965-11,004 ft. The company also opened a new pool in Waller County with the 1 Humphrey, John H. Pierson Survey, Abstract 389. On 12-hour gage, the well flowed 143 bbl. of fluid (50 per cent of which was 48.8°-gravity oil) through perforations at 10,692-10,700 ft.

ROCKY MOUNTAIN AREA.—In Wyoming, a possibility of a Muddy sand failure in the Glenrock area is reported following tests at Phillips Petroleum Co.'s well southeast of the recent discovery. Leasing has continued active in the south side of the Powder River Basin and several new wildcat locations have been announced. Oil was found in the base of the third Dakota at the Ohio Oil Co.'s 3-mile northwest extension in the Huntsman area, Cheyenne County, Nebraska.

WEST TEXAS.—George P. Livermore et al., 1 Reinecke, Section 53, Block 25, H&TC Survey, Borden County (see earlier story on this page), flowed 340 bbl. in 5 hours through a ¼-in. choke from pay at 6,754-98 ft. on the first test after completion. P. R. Rutherford et al., 1 Griffin, Section 57, Block 25, H&TC Survey (see same story) recovered 4,380 ft. of salt water on drill-stem test at 6,936-42 ft.

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An accurate recording on every run.

SIMPLE TO RUN
Merely unscrew disc retainer, insert aluminum recording disc, pull timing plunger out to desired number of minutes, and replace disc retainer.

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MICHIGAN

New Dundee Development Test Flows 70 Bbl. in 4 Hours

MOUNT PLEASANT. — Location for a new Dundee development test on the northwest side of the Coldwater field, Isabella County, was staked as Scott Drilling, Inc.'s 1 Bristol, S½ SW SE 19-16n-6w, flowed as much as 70 bbl. of oil in 4 hours natural from a Dundee pay. Well is presently bottomed out as 3,819 ft., 5 ft. in the objective. Tubing had not been run at midweek, but completion work was scheduled to start with first indication of improved weather conditions. The 1 Bristol appeared to offer excellent possibility for further expansion of the Coldwater pool to the west and north. Next start by the same group that drilled the Bristol will be at the 1 Hoffman, S½ SE SE 19-16n-6w, direct east offset to the new well.

Socony Vacuum Oil Co., Inc., may have established a dry-hole barrier to further northwest expansion of the Billings Dundee field, Gladwin County, with the unsuccessful completion of their 1 Grossfield, SE SE NW 2-17n-1e, a test which was structurally high but failed to log favorable reservoir conditions. Dundee top was 3,445 ft. and hole was drilled to 3,646 ft., total depth.

The first 1950 public auction of oil and gas lease rights to state-owned lands has been announced by the Lands Division, Department of Conservation, and will be held at Lansing in March, when a total of 57,541 acres of wildcat leases will be placed on the auction block. Lands offered are scattered through 22 counties in lower Michigan with largest spreads announced for Crawford (9,714 acres); Gladwin (9,313 acres); Kalkaska (5,219 acres); Lake (7,939 acres); Roscommnn (7,399 acres).

MICHIGAN WILDCAT FAILURES

Iosco County, Grant Township: Walhalla Oil Co. 1 Long et ux, SE SE SE 23-22n-6e, Dundee 3,062 ft., dry, TD 3,316 ft.

Kent County, Byron Township: McClanahan Oil Co. 1 Wolf, SE SE NE 30-5n-12w, Traverse 1,735 ft., dry, TD 1,785 ft.

Livingston County, Unadilla Township: Michigan Oil Co. 1 Marshall & Hoard, SW SW NW 34-1n-3e, Berea 1,029 ft., dry, TD 1,078 ft.

Oceana County, Benona Township: Mercer Oil Co., Inc., 1 McClellan, NW NW NW 14-14n-18w, Traverse 1,772 ft., dry, TD 1,802 ft.

OKLAHOMA

Carter County Wildcat Has Good Oil Show

ROCK HILL OIL CO. and G. C. Parker have a probable discovery well in the area about 1 mile west of Lone Grove in Carter County. Rock Hill Oil Co. and Parker 1 Yell estate, NW NW NW 35-4s-1w, had a recovery of 420 ft. of 25°-gravity oil and 30 ft. of oil-cut mud on a drill-stem test of sand at 4,972-81 ft. Test was for 1 hour. Shut-in pressure was 2,050 psi. in 20 minutes. Well is about 2½ miles northeast of production in Southwest Lone Grove pool.

Ceres pool in Noble County, rarely wider than one drilling location, keeps edging to the north. British American Oil Producing Co. 1 Schultz, SE SE NW 13-23n-1w, found the Burbank sand and set pipe at 4,384 ft. After coring, the well kicked off and flowed by heads at the rate of 12 bbl. of oil per hour. About 1 mile noth and two locations east, Sinclair Oil & Gas Co. is drilling below 3,434 ft. at 1 Sullins, SE SW NE 12-23n-1w.

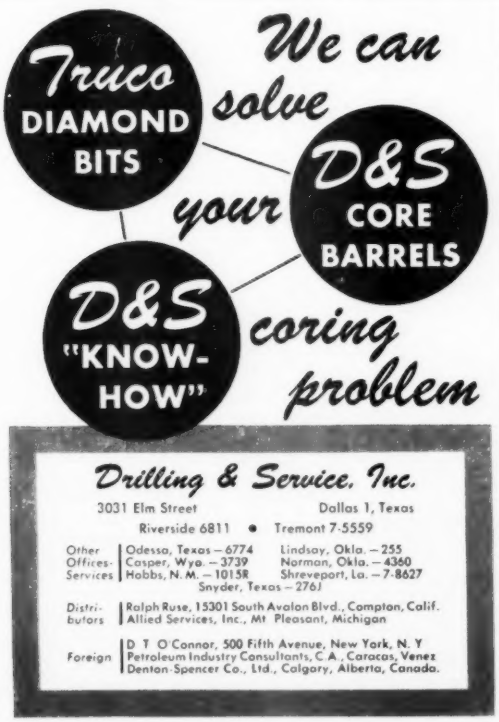
The east side of Southeast New Hope pool in Garvin County has another Bromide producer. Texas Co. 1-C Ross-Neil unit, C SE SE 15-4n-3w, found oil on a 2½-hour drill-stem test of the first Bromide at 7,743-58 ft. The test had gas in 5 minutes, 720,000 cu. ft. per day, and 40°-gravity oil in 17 minutes at the rate of 32 bbl. per hour. Recovery was 2,024 ft. of oil and 10 ft. of oil-cut mud. A previously completed Bromide producer was Sinclair Oil & Gas Co. 4 Chrystal Jones, C NE SE 10-4n-3w.

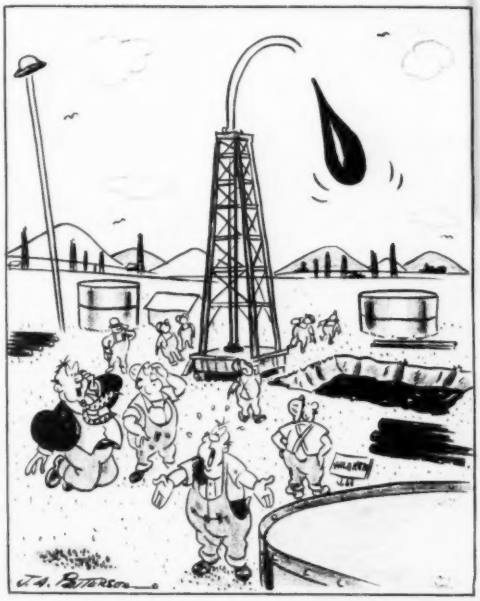
In the area north and northeast of production in Oscar and Spring pools of Jefferson County, Sun Drilling Co. has two indicated producers. Sun Drilling Co. 1 Seay, NE SE SE 22-6s-5w, pumped 71 bbl. of oil in 23 hours. About 2½ miles west of 1 Seay and northeast of Spring pool, Sun Drilling Co. 1 Samuel, SW NW NW 20-6s-5w, also is showing for a producer. Pipe was set at 1,862 ft. and after the plug was drilled and pay treated with acid, the well swabbed 5 bbl. of oil per hour. Well later pumped 4½ bbl. per hour on test.

Mead Production Co. found gas in the top of the Cromwell sand at 1 Gilby, SW SW NW 1-12n-15e, near the north edge of McIntosh County. Top of the Cromwell was found at 2,586 ft. and the gas show was estimated at 1,500,000 cu. ft. Operator is drilling ahead at 2,950 ft. in the Mississippi, called at 2,616 ft. at this cable-tool test.

In Lincoln County, R. E. Kemp and Kingery Brothers 1 Harmon, NW SW SW 3-16n-5e, has casing at 3,652 ft. for further tests of the Bartlesville after a drill-stem test at 3,654-66 ft. had a recovery of 55 ft. of oil-cut mud with a small show of gas.

Davon Oil Corp. 1 Jordan, SW SW NW 9-13n-3e, Lincoln County, flowed 27 bbl. of oil and 56 bbl. of water per day from the Oswego at 4,156-94 ft. through open tubing. This is a new pay well about ½





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mile east of the Happy Hill pool which produces from the Bartlesville.

OKLAHOMA SUCCESSFUL WILDCATS

Creek County: New pay in Cushing—Big Four Petroleum 1 Koch, C SW NW 36--8n-7e, pumped 125 bbl. of 36°-gravity oil per day from Misener at 3,559-72 ft., TD.

Hughes County: Barnsdall 1 Hughes, NE NE NE 28-8n-10e, pumped 5 bbl. of oil per day from Cromwell at 3,320-27 ft., TD, 1¼ mi. W Greasy Creek.

Love County: Sohio 1 Tims, NE NE NW 32-6s-2e, flowed 117 bbl. of 42°-gravity oil per day from 6,286-6,564 ft., TD 147 ft.

Osage County: Weems 1 Osage, SW SE NW 10-21n-8e, pumped 10 bbl. of oil per day from Buzzard at 494-512 ft., TD 518 ft.

Pottawatomie County: Delong 1 Hudson, NE NW NE 16-6n-3e, flowed 163 bbl. of 32.6°-gravity oil per day from Layton at 3,060-65 ft., TD 3,143 ft.

Stephens County: Earl Barnes 1-A Graham, NW SW SE 7-1n-5w, pumped 5 bbl. of 36°-gravity oil per day from sand at 2,613-58 ft., TD 2,667 ft.

OKLAHOMA WILDCAT FAILURES

Garfield County: Double R Drilling 1 Brown, NW NW SE 26-24n-3w, dry, TD 4,971 ft., Tonkawa lime 3,155 ft., Perry 3,445 ft., Layton 3,738 ft., Hogshooter 3,965 ft., Checkerboard 4,113 ft., Oswego 4,283 ft., Cherokee 4,408 ft., Mississippi lime 4,628 ft., Woodford 4,854 ft., Viola 4,905 ft., Wilcox 4,952 ft.

Greer County: Copeland et al 1 Dillahunty, SE SE SE 36-5n-21w, dry, TD 1,019 ft. in granite.

Hughes County: Hall 2 Leader, C NW NW 34-8n-10e, dry, TD 608 ft., (geological wildcat in Greasy Creek).

Jackson County: Tide Water 1 Johnson, NE NE SE 19-3n-23w, dry, TD 8,032 ft.

Jefferson County: Beard 1 Brooks, NW NW SE 19-3s-5w, dry, TD 3,270 ft., lime 1,790 ft., Arbuckle detrital 3,015 ft., Arbuckle 3,177 ft.

Lincoln County: Callery & Hurt 1 Kennard, SW NW SE 4-13n-2e, dry, TD 5,437 ft., Hogshooter 3,563 ft., Checkerboard 3,882 ft., Oswego 4,468 ft., Prue 4,546 ft., Verdigris 4,632 ft., Maquoketa 4,998 ft., Woodford 5,010 ft., Hunton 5,095 ft., Sylvan 5,138 ft., Viola 5,238 ft., Wilcox 5,334 ft., second Wilcox 5,405 ft.

Flynn Oil 1 Bracksieck, NE SW SE 2-16n-2e, dry, TD 5,001 ft., Pawhuska 1,502 ft., Layton 3,010 ft., Hogshooter 3,315 ft., Layton 3,325 ft., Checkerboard 3,595 ft., conglomerate 3,615 ft., Big lime 4,020 ft., Oswego 4,072 ft., Verdigris 4,232 ft., Skinner 4,241 ft., lime 4,367 ft., Red Fork 4,376 ft., Bartlesville 4,480 ft., Mississippi lime 4,568 ft., Woodford 4,614 ft., Hunton 4,654 ft., Sylvan 4,721 ft., Viola 4,816 ft., dense 4,843 ft., dolomite 4,866 ft., sandy dolomite 4,884 ft., Wilcox 4,898 ft., second Wilcox 4,946 ft.

Republic Natural Gas 1 Woolsey, NE NE NW 28-17n-2e, dry, TD 4,880 ft., Pawhuska 1,666 ft., Dewey 2,737 ft., Perry 2,772 ft., Hogshooter 3,317 ft., Checkerboard 3,590 ft., conglomerate 3,640 ft., Oswego 4,033 ft., Prue 4,176 ft., Verdigris 4,194 ft., Skinner 4,285 ft., lime 4,317 ft., Red Fork 4,366 ft., Mississippi lime 4,472 ft., Woodford 4,513 ft., Hunton 4,551 ft., Sylvan 4,640 ft., Viola 4,729 ft., Wilcox 4,794 ft., second Wilcox 4,869 ft.

Logan County: Viersen & Cochrane 1 Cohee, SE NE SW 7-17n-1e, dry, TD 5,200 ft., Misener 4,884 ft., Sylvan 4,932 ft., Viola 5,018 ft., Wilcox 5,096 ft., second Wilcox 5,164 ft.

Murray County: Gray 1 Pearson, NE NW SE 3-1s-2w, dry, TD 2,752 ft. in cherty sand and lime, base Permian 270 ft., base Pontotoc 1,285 ft.

Noble County: Wolfe Drilling Co. 1 Schultz, SW SW SW 10-33n-1e, dry, TD 4,457 ft., Avant 2,510 ft., Hogshooter 2,885 ft., Layton 3,243 ft., Checkerboard 2,695 ft., Big lime-Oswego 3,814 ft., base Oswego 4,022 ft., Verdigris 4,105 ft., Skinner 4,184 ft., lime 4,225 ft., Red Fork 4,370 ft., Mississippi lime 4,419 ft.

Osage County: Peters et al 1 Osage, SW NW NE 7-26n-5e, dry, TD 3,184 ft., Layton 2,310 ft., Hogshooter 2,437 ft., Layton 2,500 ft., Checkerboard 2,660 ft., conglomerate 2,678 ft., Big lime 2,772 ft., Oswego 2,823 ft., Prue 3,007 ft., Verdigris 3,032 ft., Skinner 3,035 ft., lime 3,074 ft., Red Fork 3,077 ft., Mississippi lime 3,164 ft.

Seminole County: Mid-American Petroleum 1 Jarvis, NW NW SW 34-11n-6e, dry, TD 4,715 ft., Calvin 2,904 ft. and 3,005 ft., lime 3,595 ft., Sylvan 4,442 ft., dense 4,586 ft., dolomite 4,595 ft., sand 4,622 ft., dolomite 4,630 ft., sand 4,640 ft., dolomite 4,675 ft., sand 4,703 ft.

Woodward County: Carter 1 Harrison unit, NE SE NE 7-23n-20w, dry, TD 7,877 ft., base Wreford 3,624 ft., Neva 3,879 ft., base Foraker 4,133 ft., Brownville 4,290 ft., Stonebreaker 4,546 ft., Buringame 4,663 ft., Hoover-Elgin 5,433 ft., Endicott 5,492 ft., Lovell lime 5,559 ft. and 5,592 ft., Lovell sand 5,670 ft. and 5,734 ft., Tonkawa sand 5,964 ft., lime 6,312 ft., Checkerboard 6,582 ft., Big lime 6,686 ft., Oswego 6,825 ft., Cherokee 6,986 ft., Verdigris 7,055 ft., lime 7,166 ft., Inola 7,284 ft., Morrow 7,488 ft., Morrow sand 7,718 ft., Chester E,764 ft.

KANSAS

Southwest Zyba Pool Gets North Extension

KIRCHNER & SULLIVAN 1 Chitwood, SE SW NE 15-30s-1w, has given Southwest Zyba pool an extension of about ¼ mile to the north. The well topped the Mississippi at 3,448 ft. and Simpson sand at 3,884 ft. Casing was set to 3,885 ft. and hole drilled to a total depth of 3,889 ft. On test, the well flowed at the rate of 90 bbl. of oil per hour.

Petroleum, Inc., has an Arbuckle well in the area south of Hazel pool and west of Gates pool in Stafford County. Petroleum, Inc., 1 Hufford, SE SW NW 28-21s-13w, topped the Arbuckle at 3,705 ft. and was completed for 70 bbl. per day from a total depth of 3,713 ft.

In the south central part of Stafford County, Shell Oil Co. has completed 1 Miller, NE SW SE 14-24s-14w, with a maximum 3,000-bbl. rating in a bottom-hole bomb test. Production is from the Lansing-Kansas City, topped at 3,606 ft. The well is between Rattlesnake and Richland pools.

The recently opened West Morel pool in Graham County has a maximum producer with the completion of Cities Service Oil Co. 1 Fury, NE NE NE 19-9s-21w. The well cut the Arbuckle at 3,846 ft. and was drilled to a total depth of 3,850 ft. with casing set to 3,847 ft.

The west side of North Berland pool in Rooks County has a maximum producer. Petroleum, Inc., 2 Sutor, NE NE NW 13-10s-20w, was completed as a maximum-potential well from the Arbuckle at 3,768-72 ft.

KANSAS SUCCESSFUL WILDCAT

Stafford County: Petroleum, Inc. 1 Brown, SW SE SW 18-21s-13w, pumped 52 bbl. of 26°-gravity oil per day from Arbuckle at 3,675-85 ft., TD 3,682 ft.

KANSAS WILDCAT FAILURES

Barton County: Republic Natural Gas et al 1 Doonan, NE NE SW 30-18s-13w, dry, TD 3,451 ft., anhydrite 828 ft., Hoxbar 3,094 ft., lime 3,161 ft. and 3,174 ft., conglomerate 3,405 ft., Arbuckle 3,406 ft.

Cowley County: Barbara Oil Co. 1 Ball, SW NW NE 20-34s-8e, dry, TD 2,780 ft., Mississippian 2,743 ft.

Dickinson County: Frank Deiter et al 1 Bennett, SW SW NE 3-11s-1e, dry, TD 545 ft., reported show of gas at 270 ft. or 290 ft.

Pottawatomie County: Ajac Oil Co. and Continental Oil Co. et al 1 Miller, NW NW SW 22-8s-12e, dry, TD 3,492 ft., Lansing 1,260 ft., Kansas City 1,377 ft.,

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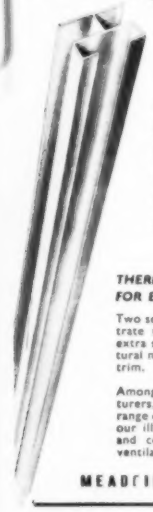

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Sumner County: K. T. Weidemann 1 Lane, C N/2 NE NE 35-30s-1e, dry, TD 3,761 ft., Layton 2,415 ft., Kansas City 2,725 ft., Mississippi chert 3,292 ft., Kinderhook 3,635 ft., Simpson 3,691 ft., Arbuckle 3,758 ft.

Harbar Drilling Co. et al 1 Somer, SE SE NW 9-33s-2e, dry, TD 3,454 ft., Stalnaker 2,215 ft., Layton 2,635 ft., Kansas City 2,700 ft., Simpson 3,330 ft., Arbuckle 3,380 ft.

Wabaunsee County: El Capitan Oil Co. 1 Buckli, C NE SW 25-13s-10e, dry, TD 3,518 ft., Topeka 960 ft., Lansing 1,560 ft., Kansas City 1,708 ft., base Kansas City 1,931 ft., Mississippian 2,610 ft., Kinderhook 2,918 ft., Hunton 3,108 ft., Maquoketa 3,245 ft., Viola 3,319 ft., St. Peter 3,438 ft., Arbuckle 3,500 ft.

SOUTHWEST TEXAS

New Pool Opened Near Falfurrias, Brooks County

CORPUS CHRISTI.—A new pool is being opened 23 miles southwest of Falfurrias in Brooks County, by H. L. Hawkins 1 Singer Estate. The wildcat tested between 200 and 300 bbl. of 45°-gravity oil through perforations at 4,050-58 ft., with 350 psi. casing pressure. Operators then plugged back and perforated from 4,005-28 ft. The well came in flowing an estimated 200 to 300 bbl. of oil through a ¼-in. choke, with 150 psi. pressure on the tubing. The well then died, came back up, and died again. Operators have now gone back in the hole and are acidizing with mud acid.

Humble Oil & Refining Co. has completed the 1 King Ranch-Canelo for an oil discovery in the Salto area, 6½ miles from Riviera, Kleberg County. Operators set 5½-in. production casing at 10,590 ft. and perforated 5,210-21 ft. for completion attempt. The well flowed 8 bbl. of 49.8°-gravity oil daily through a ¼-in. choke, with 700 psi. pressure on the tubing, casing sealed. The hole was drilled to a depth of 11,839 ft. and pay was topped at 5,210 ft. The new discovery is located in the CCSD&RGNG RR Survey 307.

Superior Oil Co. had a good show of oil in the 1 Minnie S. Welder, wildcat test 5 miles northeast of Sinton, San Patricio County. A drill-stem test was run and oil and gas was recovered. No details are known on the wildcat, except that operators are coring below 8,215 ft. Test is located in Section 24, Subdivision of Eliza H. Welder Ranch, C. J. Franco-E. & F. R. Portilla Survey, Abstracts 25 and 26.

Orlee Oil Co. has completed the 2 Lopez Estate, confirming production in the new Orlee field, Duval County. The hole was drilled to a depth of 1,710 ft., topping the pay at 1,695 ft. Through perforations at 1,697-701 ft. the well pumped 20 bbl. of 19°-gravity oil daily. The well is 660 ft. southeast of the 1 discovery well, 5 miles north of Bruni.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Dimmitt County: New gas pay at Wintergarden—Continental Oil Co. 2 McKnight, R. S. Riddle Sur. 9, TD 3,310 ft., perf. 2,804-11 ft., IP: 5,100,000 cu. ft. gas per day, open flow, SITP 1,227 psi., SICP 1,230 psi.

Kleberg County: New oil discovery—Humble Oil & Refining Co. 1 King Ranch-Canelo, CCSD&RGNG RR Sur. 307, 6½ mi. W of Riviera, top pay 5,210 ft., TD 11,839 ft., perf. 5,210-21 ft., IP: 8 bbl. oil per day, ⅛-in. choke, TP 700 psi., 49.8° gravity.

Nueces County: New pay at Cement—Henshaw Bros. & O. R. Mitchell 1 H. R. Bryant, Sec. 45, Geo. H. Paul Subd., top pay 6,196 ft., TD 6,702 ft., PBTD 6,205 ft., perf. 6,196-201 ft., IP: 16 bbl. oil per day, 9/64-in. choke, TP 125 psi., CP 800 psi., 37.8° gravity.

Starr County: New pay at Rincon—Continental Oil Co. E-12 T. B. Slick Estate, Sur. 537, top pay 5,323 ft., TD 5,703 ft., perf. 5,409-21 ft., IP: 204 bbl. oil per day, 12/64-in. choke, GOR 1,043, TP 975 psi., CP 1,275 psi., 44° gravity.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Caldwell County: Tarpon Oil & Gas Co. 1-B T. H. Brown, D. Benton Sur., 5 mi. NE of Lockhart, dry, TD 1,835 ft.

Duval County: M. L. Massingill et al B-1 D. C. Chapa, N. Nunez Sur. 61, 10 mi. S of Freer, dry, TD 3,000 ft.

The Texas Co. 1 Ysidrio Garcia, Jose Marcelo Ynojosa Sur., A-628, 4½ mi. SE of Realitos, dry, TD 6,942 ft.

Guadalupe County: Sherman Nelson 1 Meta Matthies, William Ragsdale Sur., 2½ mi. NE of Geronimo, dry, TD 1,382 ft.

Milam County: Buda Oil Co. 2 Jim Bartlett, J. J. Acosta Gr., 17 mi. NW of Rockdale, dry, TD 2,067 ft.

Nueces County: Ben D. Marks, Trustee 1 Francis Clark Lockett et vir, Lot 6, Wm. J. Robertson Tract, 6 mi. SW of Corpus Christi, dry, TD 4,818 ft.

H. R. Smith-Rodney DeLange-F. A. Gillespie & Sons 1 O. G. Beck, Block 1, Wade Riverside Subd., 2 mi. NW of Robstown, dry, TD 8,256 ft.

Starr County: C. S. Albrecht 1 P. S. DeReynaga, Porc. 110, 25 mi. N of Roma, dry, TD 1,204 ft.

Webb County: O. W. Killam 3 Bruni Estate, Sur. 129, 3,700 ft. NE of 2 well (dry hole), dry, TD 2,495 ft.

William & Hurd, Inc., 1 Garcia heirs, Block 2, Sur. 592, Ojuelos Grant, 1 mi. SE of Mirando City, dry, TD 2,505 ft.

TEXAS GULF COAST

Deep Wilcox Production Opened in Newton Field

HOUSTON.—Deep Wilcox pay in Newton field, Newton County, has been opened with completion of The Texas Co. 1 Newton Lumber Co.-Derrough Unit. On potential, through a 12/64-in. choke, the well reported a flow of 140 bbl. of 44.4°-gravity oil daily through perforations at 10,965-11,004 ft. Hole is bottomed at 11,500 ft.

In Waller County, The Texas Co. is opening a new oil pool with completion of 1 Humphrey, John H. Pierson Survey, Abstract 389. On a 12-hour gage, the well flowed 143 bbl. of fluid through a 10/64-in. choke. The fluid was 50 per cent 48.8°-gravity oil and 50 per cent basic sediment and water. Production is through perforations at 10,692-700 ft. This discovery is located approximately 2 miles southeast of a gas discovery well in Grimes County.

On the west edge of Orange County, John W. Mecon has run a string of casing, with no confirmation as to the depth of the casing seat, in the East Beaumont Townsite Co., wildcat, 6 miles east of Beaumont.

Meanwhile, in Orange County, Houston Oil Co. and American Republics Corp. continue to test 1 E. P. Lipscomb et al, wildcat, in Josiah Brick Survey, Abstract 48. The well was perforated at 7,650-60 ft. and test gas-condensate on ¼-in. choke, with 2,950-psi. tubing pressure. The well previously had recovered amber-colored condensate on a drill-stem test at 7,690-712 ft. Potential gage on the well is expected shortly.

In the High Island area, Galveston County, Placid Oil Co. is continuing to test the lower sand in the 9 Roberts & Mueller, after having squeezed off the original per-

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forations. Well is bottomed at 11,000 ft. and operator has cemented 7-in. casing at 10,985 ft. for testing. The deep test is located in the John Grogan Survey, Abstract 104.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCAT

Goliad County: New pay at South Cabeza Creek—Continental Oil Co. 1 Adrian Flores, George Elliott Sur., A-119, top pay 5,285 ft. (Cook Mountain), TD 5,330 ft., perf. 5,286-94 ft., IP: 57 bbl. oil per day on gas lift, GOR 1,110, 46.9° gravity.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Bee County: S. Chamberlain 1 Mrs. Amos G. Welder, Thos. Quirk Sur., A-57, 5 mi. W of Blanconia, dry, TD 5,122 ft.

Brazoria County: Cecil Hagen 1 Joe Bingham Est., Francis Bingham Sur., A-43, 8 mi. SW of Arcola, dry, TD 5,920 ft.

Matagorda County: Stanolind Oil & Gas Co. 1 Carrie J. Burkhart, West Pleasant area, John Lowry Sur., A-349, 6 mi. N of Palacious, dry, TD 9,500 ft.

EASTERN TEXAS

New Wood County Pool Gets Confirmation Well

DALLAS.—Hollandsworth Oil Co. 1 Four States Oil Co., confirmation well for the Earl Lee field in southeastern Wood County, completed this week flowing 196 bbl. of 22.4°-gravity oil a day through ¼-in. choke, from perforations in the Woodbine at 5,460-5,502 ft. Flowing pressure on tubing ranged from 110-120 psi. Total depth was 5,524 ft., with 5-in. production string set at 5,520 ft. On elevation of 465 ft., sample top on the Woodbine was 5,402 ft., which was said to be somewhat high to the discovery well.

A Hollandsworth Drilling Co. rig was being moved to location for the company's 1-B George A. Schenewerk, also in the William Fisher Survey, and spotted 1,300 ft. southwest of the 1 Four States and 2,550 ft. south of the 1 Schenewerk.

In the Pine Mills townsite, Allen Guiberson and R. J. Caraway were drilling below 5,200 ft. at their 1 C. E. Burkett, J. B. Mansell Survey. There was said to be some difficulty in keeping the hole straight. Operators expected the Woodbine around 7,000 ft.

Coats & Hearrell were to move in rig for J. K. Hughes Oil Co. 1 B. B. Clonts. Proposed location was in the Brooks and Burleson Survey, some 5 miles east of the Pine Mills townsite and 1½ miles east of Pine Mills field.

In the Brush Creek area 10 miles north of Palestine, Anderson County, Douglas & Johnson 1 J. W. Braley, Little Survey, prepared to core for the Woodbine at 5,211 ft. Location is on a Pure Oil Co. farmout and northeast of an earlier Woodbine failure drilled by Tide Water Associated Oil Co.

Delta Drilling Co.'s deep test in Blackfoot field, 1 Busell, I&GN Survey, was going to the James line after finding the Rodessa barren. At last report it was drilling around 10,000 ft.

EAST TEXAS (DISTRICTS 5, 6 AND 6-P) WILDCAT FAILURES

Angelina County: J. M. Wren 1 L. D. Nerren "B," 28-acre tract, Emile Saunders Sur., 5 mi. SE Huntington, dry, TD 3,080 ft.

J. M. Wren 1 L. D. Nerren, Emile Saunders Sur., 5 mi. SE Huntington, dry, TD 2,682 ft., Crockett 1,148 ft., Weches 1,803 ft., Queen City 1,981 ft., Wilcox 2,192 ft., swabbed some oil and gas from 1,978-2,000 ft., shut down when swab line broke.

Upshur County: Tide Water Associated Oil Co. 1 C. K. Wade, 94-acre tract, John

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H. Field Sur., 1 mi. N Kelsey, 350 ft. NW Amerada 1 Futrell, dry, TD 13,078 ft., elev. 436 ft., logged Hill 6,848 ft., Young 7,103 ft., James 7,200 ft., Pettit 7,359 ft., Travis Peak 7,510 ft.; base Massive anhydrite 6,732 ft., top Cotton Valley 8,950-60 ft.

N. CENTRAL TEXAS

Two Discovery Prospects Prepare for Completion

WICHITA FALLS.—A deeper pay discovery for Wise County was in prospect at Cities Service Oil Co. 1 S. Williamson, Block 4, Falls County School Land Survey, 5 miles northwest of Alford. Casing was perforated with 60 shots from 7,030-40 ft., after which the well flowed 20 bbl. of oil the first hour through ½-in. choke. Changed to 15/16-in. choke, the well flowed 35 bbl. of oil in 1 hour, and 16 bbl. of oil the next hour through ¾-in. choke. Last week, this well was reported as the first Viola lime producer for the county. However, the pay has been reclassified as the Simpson of middle Ordovician age.

Another probable discovery in the same county was Leland Fikes and Standard-Fryer Drilling Co. 1-A Conley, M. Swift Survey, 4 miles southeast of Chico. At last report, casing was set to 5,849 ft. on bottom, for completion. A 2-hour drill-stem test in the Bend conglomerate from 6,570-91 ft. had gas in 8 minutes, and recovered 4,800 ft. of oil, plus 120 ft. of oil-cut mud.

Activity in the southeastern part of the county included: Akin & Dimock 1 W. M. Kinsey, Block 5, J. Mora Survey, 3½ miles southeast of Cottondale, shut down for repairs at 3,666 ft.; Sorrells Oil Co. and others' scheduled new wildcat 4 miles southeast of Rhome. The new well will be the 1 R. A. Hudson, 660 ft. from south and 1,980 ft. from west lines, William Carney Survey, 2 miles west of the Denton County line. Contract depth is 9,000 ft., or the Ellenburger.

In Coleman County, 3½ miles south of Novice, United North & South Development Co. completed its 3 R. M. Freeman as a gas discovery from the King sand at 1,958-73 ft. The well had previously made an estimated 35 bbl. of oil a day for 10 days from perforations in the Ivan lime at 2,097-2,106 ft. At the end of the 10 days the oil was apparently exhausted.

In south-central Jack County, Russell Maguire 1 E. C. Richards, T. Martinez Survey, 6 miles south of Jacksboro and 3 miles west of Steed-Worsham conglomerate field, had discovery pay in the Beng conglomerate at 5,321-38 ft. On potential test, the well flowed 42.28 bbl. of oil in 20 hours through 4/64-in. choke, for a calculated daily potential of 50.74 bbl. of 42°-gravity oil. Bridwell Oil Co. extended Caddo production ½ mile north of Fields pool at its 1 Carl Sanzenbacher, Block 9, Grayson County School Land Survey, 2½ miles north of Blue Grove. A drill-stem test from 5,820-36 ft. had gas in 3 minutes and at the end of 75 minutes recovered 50 ft. of free oil, plus 100 ft. of heavily oil and gas-cut mud. Bottom-hole pressure was 2,500 psi.

Potomac Oil Co. 1 M. S. Roberts, L. McCulley Survey, confirmed Bend glomerate production in Haws field of Montague County, when it flowed 203 bbl. of oil in 5 hours through ½-in. choke from pay at 6,252-6,300 ft., giving the well a calculated daily potential of 978 bbl. Location is a northeast offset to the discovery, opend by The Texas Co. late in 1949.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Clay County: Continental Oil Co. 1 Alliance Trust Co., 467 ft. from N, 660 ft. from E lines, Blk. 27, Orange CSL, 2½ mi. S Henrietta, TD 6,000 ft., flowed

(Continued on page 238)

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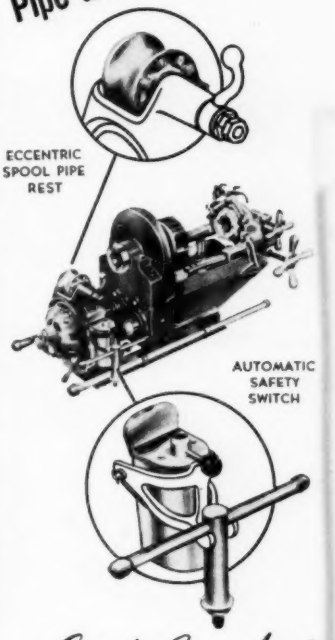

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APPALACHIAN FIELD

Wood County, W. Va., Test Fails to Find Production

PITTSBURGH.—An Oriskany sand wildcat test in Steele district, Wood County, West Virginia, resulted in a dry hole. The well, Godfrey L. Cabot, Inc. 1-1313 G. P. Burkhart, topped the Corniferous lime at 4,650 ft. and the Oriskany at 4,763-4,805 ft. with a show of gas at 4,764 ft. On an elevation of 724 ft., it was bottomed at 4,815 ft. In this same district, Columbian Carbon Co. 1-1139 A. C. Radcliff et al is drilling at 5,162 ft. in the Oriskany sand.

Two wells are below 5,000 ft. in Portland district, Preston County: Hope Natural Gas Co. 9391 John & Edna Murphy, elevation 2,152 ft., is drilling at 5,399 ft. (the gas in the chert at 5,248-57 ft. now tests 3,087,000 cu. ft.); Snee & Eberly et al 2 Cora E. Lewis, elevation 1,953 ft., is drilling at 5,415 ft. A good shallow sand gas well was reported in Oceana district, Wyoming County: United Producing Co. 25-1662 Pardee Land Co. gaged 2,374,000 cu. ft. of gas in the Maxton sand. Total depth is 2,877 ft.

In Derry Township, Westmoreland County, Pennsylvania, Peoples Natural Gas Co. 4-3814 Camilla Giffen, elevation 2,238 ft., resumed drilling operations and the depth is now 9,059 ft. In Croyle Township, Cambria County, this company's 1-3878 Joseph Gavany, elevation 2,245 ft., is shut down at 4,058 ft. to acidize. In Napier Township, Bedford County, South Penn et al, Snee & Eberly 1 Jesse B. Miller, elevation 1,666 ft., is drilling at 6,501 ft.

In Garrett County, Maryland, Eberly & Snee 1 George H. Blocher is drilling at 3,779 ft., and Fix & Trimble have completed the rig at their 1 Edward Kite.

WEST VIRGINIA WILDCAT FAILURE

Wood County, Steele district: Godfrey L. Cabot, Inc. 1-1313 G. P. Burkhart, dry, TD 4,815 ft.

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ROCKY MOUNTAIN

No Details Released by Phillips on Glenrock Test

DENVER.—Reports from Douglas, Wyo., indicate the possibility that Phillips Petroleum Co. has found no oil in the Muddy sand at the second well in the Glenrock field, Converse County. The well is the 1 Brubaker, SW SW SW 33-34n-75w, east offset to the Steelco Drilling Co. discovery well in this pool. Steelco 1 McDonald flowed 21 bbl. of oil per hour from the Muddy sand when it was completed recently. The Phillips well is a tight hole with no release of tops or tests and it is now reported by the operator at 7,186 ft., total depth, and is testing, with no results announced. Steelco is now drilling two additional wells southeast of the 1 Brubaker and recently shows of oil were reported in the Wall Creek sand between 5,960-6,010 ft. and the operator is now drilling below 6,427 ft. on this well.

In the meantime activity through the entire southern part of the Powder River Basin indicates a sizable exploratory-drilling campaign in this area during the coming year. Ajax Oil Co. has made location for 1 Hawley-Scott, NE SW SE 12-33n-75w, a wildcat in the Box Elder Junction area 4 miles southeast of the Glenrock field. West of Glenrock Reserve Drilling Co. has made location for 1 Young, NE SE NE 6-33n-75w, a 2-mile west extension in the Glenrock area. Southeast of the town of Douglas the El Capitan Drilling Co. of Wichita has made location for 1 Adair, C SW SW 30-32n-71w. The operator is moving in materials for this wildcat. Phillips Petroleum Co., Fontier Refining Co., Stanolind Oil & Gas Co., General Petroleum Corp., and others have been active in leasing in the southern Powder River Basin area for the past 3 months and there is at present a great amount of geophysical and geological work under way.

As a further surprise development in the Huntsman area, Cheyenne County, Nebraska, Ohio Oil Co. recovered oil on drill-stem test in the base of the Third Dakota sand at its 1 Gurschke, SW NE SE 3-14n-50w. Top of Third Dakota was logged at 4,872 ft. and on drill-stem test from 4,886-4,900 ft., the well made 639 ft. of oil, 90 ft. of heavily oil and gas-cut mud, and 90 ft. of water-cut mud. The tool was open for 60 minutes. The test is of interest as Ohio had previously tested only gas in the Third Dakota. Gas recovered on test both at 1 Gurschke and 1 Cruise in the Third Dakota discovery well in this pool indicates a large amount of condensate with the gas, but complete analysis of the gas has not been reported by the Ohio Oil Co., operator of this and the Gurley pool, a Dakota sand oil field northeast of Huntsman. The operator is now running casing at 1 Gurschke prior to final completion tests on the well.

New locations.—There were 25 new locations during the week with 20 of these in Wyoming. Of the 20, 19 were in the North Meadow Creek-East Sussex area, Johnson County, where the Mimi Co. of Dallas is now conducting a rapid development-drilling program. In Colorado, Hathaway Co. of Santa Fe Springs, Calif., made location for a Dakota test in the Red Mesa area, La Plata County. The well is 1 Hall, SE NE NW 22-33n-12w (NMPM). Previous wells in this area south of Durango

have had Dakota sand shows but none have been of commercial status.

WYOMING WILDCAT FAILURE

Albany County, South Lake Hattie: Glendale Oil Co. 1 Embree, SE SE SE 25-14n-77w; 1,735 ft. TD; abnd.; Base Sundance 565 ft., Forelle 1,345 ft., Tensleep 1,712 ft., water.

LA.-ARK.

Union County, Arkansas, Dual Producer Completed

SHREVEPORT.—Completion report was in this week on C. H. Murphy & Co. 1 W. K. Gregory, discovery and dual producer from the Cotton Valley and Smackover formations, located in the southwest corner of Union County, Arkansas.

Total depth was 9,500 ft. and elevation was 207 ft. Cotton Valley perforations at 8,012-22 ft. flowed 224 bbl. of 43°-gravity oil in 24 hours, through ¼-in. choke, under casing pressure of 300 psi. and gas-oil ratio of 900 cu. ft.

Smackover perforations were from 9,278-88 ft., which gaged 200 bbl. of 47°-gravity oil a day through ¼-in. choke, under tubing pressure of 2,000 psi. and gas-oil ratio of 1,200 cu. ft.

Murphy's 1 Pepper, NE SE NE 32-18s-15w, Smackover test in El Dorado field, was coring below 7,703 ft. in the Smackover. Drill-stem test from 7,608-14 ft., open 20 minutes, recovered 1,500 ft. of water cushion, 360 ft. of oil and 120 ft. of mud. Bottom-hole flowing pressure was 885 psi. A test from 7,608-34 ft., open 20 minutes, recovered the same amount of water cushion, 450 ft. of oil and 180 ft. of gas-cut mud. Cores from 7,580-7,703 ft. returned shows of oil, stains and spotted stains throughout.

Spartan Drilling Co.'s Union County wildcat, the 1 Sallie Irby in 22-18s-17w, was drilling below 7,711 ft. in the Cotton Valley. No shows had been reported below the side-wall samples taken at 3,200, 4,012 and 5,654 ft. Top on the Cotton Valley was logged at 5,444 ft., on elevation of 286 ft.

British-American Oil Producing Co. 1 Sheppard, 15-19s-17w, Union County, was in the Travis Peak, topped at 4,460 ft., and drilling ahead at 5,872 ft. Elevation was 267 ft.

Louisiana wildcat reports included the following: Bert Fields 1 Thigpen-Herold, 23-16s-16w, Caddo Parish, was drilling below 7,787 ft., still in the Travis Peak.

In Willow Lake field, Petersen Drilling Co. and Pan Am Southern 1 Womack & Cotton, 1-6n-6e, had drilling under way and was in the upper Cretaceous reported at 4,921 ft. The new operation has been scheduled to 9,700 ft. to test the Tuscaloosa.

Gulf Refining Co. 1 Kinnebrew, 26-20n-7w, Claiborne Parish, had total depth at 11,056 ft., in the Smackover, and was taking side-wall cores at 8,150-8,216 ft. No tests were reported for the dep formation. Tentative top was 10,203 ft.

Two miles north of Lamar field, Franklin Parish, H. B. Brown 1 Stout, 15-16n-9e, was drilling at 4,737 ft. in the lower Cretaceous.

Southwest Natural Gas 1 Colvin, 31-20n-2w, Lincoln Parish, was drilling at 7,771 ft.

Monla Gas Co. 1 Hinton-Allen, 9-19n-1e, Union Parish, was drilling below 10,121 ft., in the Cotton Valley.

NORTH LOUISIANA SUCCESSFUL WILDCAT

Claiborne Parish: Ohio Oil Co. and Gulf Oil Corp. 1 O. L. Martin, 2,020 ft. N, 660 ft. W SE corner 3-22n-7w, TD 11,755 ft., PB 9,136 ft. in Cotton Valley, perf. Stray sand 9,025-80 ft. and 8,852-8,902 ft., flowed 40 bbl. of 42.3°-gravity oil a day, 16/64-in. choke, GOR 7,020 cu. ft., TP 150 psi., CP 725 psi., suggested name Southeast Haynesville.

NORTH LOUISIANA WILDCAT FAILURES

Concordia Parish: R. A. Campbell 1 Merrill Est., 24-7n-10e, dry, TD 6,663 ft., elev. 66 ft., Cockfield 2,020 ft., Sparta 2,823 ft., Cane River 3,625 ft., Talahatta 3,990 ft., Wilcox 4,073 ft., base Big shale 5,378 ft.

Kemp Drilling Co. 1 Sadie G. Smith, 14-7n-10e, dry, TD 7,435 ft., elev. 60 ft., Vicksburg 1,417 ft., Moody Branch 1,935 ft., Cockfield 1,951 ft., Cook Mountain 2,496 ft., Sparta 2,720 ft., Can River 3,552 ft., Wilcox 3,981 ft., base Big shale 5,258 ft., Harris sand 5,611 ft.

ARKANSAS WILDCAT FAILURE

Miller County: British American Oil Production Co. 1 S. S. Crank, NW SE NW 36-15s-36w, dry, TD 3,122 ft., elev. 235 ft., Arkadelphia 1,030 ft., Nacatoch 1,190 ft., Saratoga 1,650 ft., Tokio 2,312 ft., Eagleford 2,582 ft., Tuscaloosa 2,716 ft., Paluxy 2,810 ft.

MISSISSIPPI

Carter Completes State's First Travis Peak Well

JACKSON.—Carter Oil Co. 1 J. L. Wilson, 30-12n-3e, Pickens field area, Yazoo County, was successfully completed for the first Travis Peak production in the state. On potential, the well flowed 159 bbl. of 42.3°-gravity oil daily through 16/64-in. choke, with 590 psi. pressure on the tubing. The well was drilled to a depth of 12,250 ft. and plugged back to 8,500 ft. Pro-

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duction is through perforations at 7,728-37 ft. in the lower Cretaceous sand.

Humble Oil & Refining Co. has announced a gage on the D-1 McKittrick, 50-7n-3w, Adams County, with the well reported pumping 38 bbl. of 27°-gravity oil daily through perforations at 10,300-20 ft. Well is located on the southern edge of the Natchez city limits and was the first oil field discovery of the curent year. Unconfirmed reports were that the well logged a good show in the Wilcox at approximatly 5,000 ft. but no information has been released on the possibilities.

In the newly discovered Russum field, Jefferson County, Stanolind Oil & Gas Co. is moving in a workover rig to rework the 1 J. B. Dockery, discovery well for the field. This test was completed in the Lower Tuscaloosa on pump and had been pumping approximately 60 bbl. of oil daily with very little water, when almost overnight it went to 100 per cent salt water. It is thought that a faulty cement job might have caused this.

Approximately 2 miles north of Pickens field, Lawrence & Morris are preparing to deepen the 1 School Board, 16-12n-3e, Yazoo County, to the Travis Peak sand. The well is currently shut down at 5,001 ft. with no shows logged in the Eutaw sand.

MISSISSIPPI SUCCESSFUL WILDCAT

Yazoo County: New oil sand in Pickens field—Carter Oil Co. 1 J. L. Wilson, 30-12n-3e, top pay 7,728 ft. (Travis Peak), TD 12,250 ft., PBTD 8,500 ft., perf. 7,728-37 ft., IP: 159 bbl. oil per day, 10/64-in. choke, TP 590 psi., 42.3° gravity.

MISSISSIPPI WILDCAT FAILURES

Adams County: Dorris Ballew & B. C. Callon 1 Jefferson Smith, 46-7n-2w, dry, TD 6,503 ft.

Franklin County: Kemp Drilling Co. et al 1 Crosby Lumber Co., 20-7n-1e, dry, TD 6,820 ft.

Jackson County: Southeastern Drilling Co. & J. R. Brown 1 C. L. Dees, 28-5s-7w, dry, TD 9,030 ft.

Jasper County: Tip Ray et al 1 Masonite Corp., 8-4n-11e, dry, TD 6,315 ft.

FLORIDA WILDCAT FAILURE

Taylor County: Gulf Refining Co. 1 Brooks-Scanlon, Inc.-Block 37, 17-6s-9e, hole cratered, TD 207 ft.

CALIFORNIA

Standard's Van Sicklin Disappointing on Test

LOS ANGELES.—Standard Oil Co. of California Lost Hills test, 45 Van Sicklin, is proving disappointing on test. Located in 36-27s-21e, this well bottomed at 14,597 ft. is a try for deep production in the Lost Hills field. Casing has been jet perforated in the intervals of 11,945-55, 11,900-12,000, 12,040-50, 12,108-15, and 12,159-79 ft. So far swabbing operations have produced only gassy mud, and little hope is held for success.

The Eocene test of General Jetroleum Corp. in the Lost Hills field is now spot coring at 8,595 ft. The well, 33-11 Williamson, 11-26s-20e, is considered higher structurally than the Standard Van Sicklin test.

Independent Exploration Co.'s abandoned wildcat, 52 Bennett-Smith, near Hanford in Kings County, has furnished some additional geologic points for Section 31-18s-23e. Total depth is 6,015 ft.; top of Santa Margarita was 2,983 ft.; McClure shale 3,369 ft., Kettleman sand 3,620 ft., Continental Miocene top 4,524 ft., bottom 5,531 ft.; top Eocene 5,590 ft., and top Cretaceous 5,900 ft. The Kreyenhagen was not present.

At Tejon Hills the Pedro Petroleum Co. test, 1-A, is again abandoned. The test was deepened from 790 ft. reaching granite at 1,105 ft.

One more of the Riverside tests near Corona, sparked by finding of heavy oil in 1 Orangethorpe, has been found dry. Victor Berghofer went to 1,064 ft. without production. The well is now plugged at 950 ft. and will be completed as a water well. Location is in Section 12-5s-6w.

A little more life has been added to the Placerita field with the deepening of present wells. Most were finished high on the sand. New depths are around 1,900-2,000 ft. Four recompletions last week brought in added production of 632 bbl. per day.

Tide Water Associated Oil Co. brought in a good producer in the Belgian anticline area of Kern County. The 47 Stone was completed at 5,069 ft. in Phacoides sand. A test on the interval 4,738-72 ft., open 90 minutes, brought gas in 8 minutes and fluid in 26 minutes. The well flowed 1,000 bbl. daily gross, around 50 per cent cut, with 1,000 M.c.f. gas. The oil ran 37° gravity. Location is Section 30-30s-22e.

In the adjoining section, 29-30s-30e, The Texas Co. has abandoned its 27-29 Westpit Unit 5. The try, bottomed at 5,273 ft., was given up after running an electric log and dipmeter.

In the Arvin field, Apex Petroleum Corp. has started deepening operations on 1 Cattani, 15-31s-29e. The well is a former Superior Oil Co. well, and deepening follows falling production which has made it a noncommercial well.

CALIFORNIA WILDCAT FAILURES

Fresno County, Monocline Ridge area: Western Gulf Oil Co. 82-35 L. Lillis, 35-17s-14e, dry, Kreyenhagen shale 3,356 ft., TD 3,590 ft., elev. 620 ft.

Kern County, Comanche Point area: B. C. Mackey 1 Collins, 31-32s-30e, dry, brown shale 495 ft., weathered granite 700 ft., TD 714 ft., elev. 1,055 ft.

Tejon Hills area: T & E Drilling Co. 4 T & E, 2-11n-18w, dry, Santa Margarita 554 ft., TD 709 ft. in green sand, 1,149 ft.

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Los Angeles County, Newhall area: General Petroleum Corp. 2 Circle J, 26-4n-16w, dry, TD 6,112 ft., elev. 1,312 ft.

Madera County, Madera area: Von Glahn Oil Co. 1 Mendoza, 24-10s-17e, dry, granite 2,383 ft., TD 2,452 ft., elev. 327 ft.

San Bernardino County, Carbon Canyon area: C. D. Howe 1 Downs, 31-2s-8w, dry, TD 1,730 ft., elev. 1,385 ft.

Santa Barbara County, San Marcos area: Lewis Welch 2 Lazy R. G., 19-6n-28w, dry, TD 6,636 ft. in Knoxville, elev. 1,250 ft.

Santa Cruz County, Boulder Creek area: Honolulu Oil Corp., Seaboard Oil Co., and Doheny 1 Hinman, 17-9s-2w, dry, TD 5,905 ft., elev. 846 ft.

PERMIAN BASIN

Long Southwest Step-Out In Scurry Development Made

MIDLAND.—George P. Livermore, Inc., 1 W. Reinecke, southeast Borden County wildcat, had established a long step-out southwest trend to the Scurry County reef development, on the basis of a drill-stem test. Operators set 7-in. casing at 6,754 ft., top of the reef, and production tests were to be made.

On elevation of 2,348 ft., the Reinecke was reported 326 ft. high to the Von Roder discovery, and about 800 ft. higher than Standard Oil Co. of Texas 1 Griffin, Borden County well which is currently testing the Ellenburger.

The 1 Reinecke was tested from 6,754-84 ft., total depth. Oil came to the surface in 19 minutes and it was cleaned into pits for 7 minutes, then flowed to tanks for 30 minutes, during which it gaged 24 bbl. of clean oil through $\frac{5}{8}$-in. bottom choke. The pay section had not been acidized. Recovery in the pipe was 1,080 ft. of oil and 5 ft. of drilling water.

Location is 667 ft. from north and 660 ft. from west lines, south half, northwest quarter of 53-25-H&TC Survey, which places it $5\frac{1}{2}$ miles southwest of Amerada Petroleum Corp. 1 Von Roeder.

P. R. Rutherford, Heep Oil Corp. and Conroe Drilling Co. 1 T. L. Griffin, 57-25-H&TC, about 2 miles northeast of the 1 Reinecke, topped the reef at minus 4,612 ft., or 206 ft. low to the Livermore well. It logged 20 ft. of lime with some stains in samples to total depth of 6,962 ft., and was making a drill-stem test at last report. Earlier drilling reports showed operators had expected top of the reef around 6,750 ft. On elevation of 2,322 ft., another source placed top of the reef at approximately 6,940 ft., or about 215 ft. lower than the Livermore test.

Standard of Texas 1-6 T. L. Griffin, 35-25-H&TC, southeast Borden County wildcat (on the south Borden County line), placed a tentative top on the Ellenburger at 8,815 ft. A drill-stem test from 8,817-36 ft., open 90 minutes, produced a light blow throughout and recovered 45 ft. of oil and gas-cut mud. Bottom-hole flowing pressure was 75 psi., which did not build up when shut in for 30 minutes. Operators drilled ahead below 8,836 ft., in dolomite, and were to run another test to 8,850 ft.

Heyser & Heard, Dallas, staked a west offset to G. P. Livermore's 1 Reinecke, as the 1 A. L. Holley, SE NE 52-25-H&TC. Rig from the 1 Reinecke was to be moved to the Holley location.

Texas Panhandle.—A workover at R. L. Glasner 1 Johnson, Section 1, GC&SF Survey, 3 miles west and $2\frac{1}{2}$ miles north of the Allenreed townsite, and 10 miles south of the Panhandle field in Gray County, had promises of commercial production. Drilled in the spring of 1949, it was abandoned after swabbing 2 bbl. of oil a day from pay at 2,838-40 ft. When the hole was reentered, pay was logged from 2,840-2,910 ft., which filled the hole with 1,100 ft. of oil. In swabbing it dry, recovery was 66 bbl. of 39°-gravity oil in 4 hours. Operators were installing pumping equipment.

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Co.'s Lips discovery in Gray County, Sinclair 4-D Lips, 159-13-T&NO Survey, flowed 8,230,000 cu. ft. of gas a day after treating with 500 gal. of acid to 8,553 ft., total depth. Flowing pressure was 1,020 psi. and shut-in pressure was 2,050 psi.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Garza County: New field—George Callahan & Harrison 1 J. C. Dorward, 114-5-H&GN, 2½ mi. S, 1 mi. E Justiceburg production, TD 2,470 ft., elev. 2,303 ft., San Andres pay 2,454-70 ft., pumped 70 bbl. of 36.8°-gravity oil a day, 10 per cent water.

Runnels County: Humble Oil & Refining Co. 1-C Sallie Odom, A. G. Compton Sur. 281, 8 mi. SW Wingate, 3 mi. S Fort Chadbourne discovery, TD 5,355 ft., elev. 1,946 ft., Caddo 5,295 ft., pay 5,328 ft., flowed 223.4 bbl. of 47.5°-gravity oil a day, 16/64-in. choke, GOR 1,040 ft., perf. 5,328-40 ft.

(Continued on page 235)

OHIO, KENTUCKY

West Offset to Clouse 2 Flows 1,690,000 Cu. Ft.

COLUMBUS.—The Mid East Oil 1 Brooks Foster, Section 33, Hopewell Township, Perry County, a west offset to the 2 Clouse, topped the Clinton at 2,959 ft. and finished at 25 ft. in the sand with an open flow of 1,690,000 cu. ft. of gas natural. The well has been turned into the line as a completion until the gas volume is reduced.

Ed Obermiller et al 1 Wolf-Kress, Section 24, ½-mile southeast extension to the Bethlehem Township, Stark County, gas pool, gaged 220,000 cu. ft. natural and 435,000 cu. ft. when shut in after shot.

The Oxford Oil Co. 2 F. Scheibe, Lot 10, Clark Township, Coshocton County, had 419,000 cu. ft. in the upper Clinton at 3,238-59 ft. and 288,000 cu. ft. in the lower sand at 3,271-3,305 ft., both of which will be shot before the well is completed.

The Stone Creek Brick Co.'s 1 Chas. Snyder, Lot 3, Jefferson Township, Tuscarawas County, a wildcat, logged the red Clinton at 4,630-74 ft. with 45,000 cu. ft. of gas and the white Clinton at 4,674-4,727 ft. with no showings. The test has been shut in and has rocked up to 1,360 lb. and will probably be shot.

Twelve locations from eight counties were reported for the week, Perry having three, and Hocking and Knox two each. Wells completed totaled 21, with Mt. Vernon field having 5 and Ashland and Lancaster four each.

EASTERN KENTUCKY

ASHLAND.—In the Blue Grass region of central Kentucky, and located in 11-P-61 of Madison County, Cooley Ellis et al 1 State Bank of Richmond is shut down at at depth of 2,445 ft. and thought to be bottomed somewhere in the long Knox dolomite sequence. This is about the only active wildcat in this portion of the state and its outcome is being watched with much interest.

In Martha pool of northwestern Johnson County, Ashland Oil & Refining Co. have recently completed 63 and 64 Sanford Lyons with potentials of 25 bbl. per day each. The producing formation is the Weir (Mississippian) sand at depths of 839 ft. and 900 ft. respectively.

In the old Beech Bottom pool of Clinton County, Hall & Soliday are drilling at 1,398 ft. at 1 Leo Edwards. The Beaver sand was found at 556 ft., Devonian black shale at 560 ft., and Mud Cave at 1,111 ft. Drilling is continuing towards the Knox dolomite objective.

WESTERN KENTUCKY

OWENSBORO.—The deep test in the productive Glenville area east of Guffie has a show of oil in the Devonian. Miller & Shiarella and Ashland Oil & Refining Co. 5 Elizabeth Paris, 17-N-27, swabbed an estimated 20 bbl. of oil and 50 bbl. of water in 20 hours from the Devonian at 3,750-91 ft. This area now has some production from Tar Springs, Bethel, Renault, Aux Vases, O'Hara, and McClosky while the area just to the west has additional production from the Jackson and Cypress.

In South Morganfield pool, Sun Oil Co. 5 McBride, 1-N-19, is going on pump to test the Waltersburg at 1,850-59 ft. Pay was shot with 62 qt. and swabbed at the rate of 10 bbl. of oil per hour. Further north in the pool, Sun 4 Waggener, 21-O-19, swabbed 5½ bbl. of oil per hour from the Cypress at 2,264-79 ft. after a 110-qt. shot. Well will go on pump for tests.

INDIANA

EVANSVILLE—National Associated Petroleum Co. has completed another well in Plainville pool of Daviess County. National 1 Foust & McBride, SE SE NW 2-4n-7w, two locations west of the discovery well, was completed in the McClosky at 755-66 ft. for 57 bbl. per day. About ¼ mile southeast of the discovery well, B-L-S Drilling Co. 1 B. E. Myers unit, SW SW NE 2-4n-7w, was completed in the McClosky at 756-83 ft. for 36 bbl. per day.

B-L-S Drilling Co. 8 Plainville unit, NE SW SE 2-4n-7w, is testing the McClosky at 788-98 ft. The well flowed 190 bbl. per day after treatment with 500 gal. of acid and according to late report was pumping at the rate of 12 bbl. per hour. The twin well, 8-A Plainville unit, set casing at 718 ft. and will deepen to the Aux Vases, expected at about 720 ft.

About ½ mile south of the discovery well, Skiles & Barkley 1 Keller-Gill, NE NW NE 11-4n-7w, may be completed as a gas well in the Salem lime at 1,145-1,208 ft. The McClosky at 816-38 ft. made 1½ bbl. of oil per hour but after acid wash made mostly water. The Aux Vases at 768-88 ft. failed to produce oil.

Springfield pool in Posey County has a good deep producer with the completion

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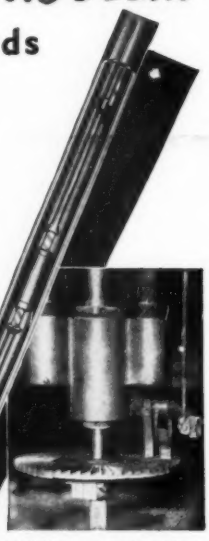

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HUBER PARAFFIN SCRAPERS

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of Carter Oil Co. 4 Ida Nichols, NE NE SW 29-5s-13w. The well swabbed and flowed 590 bbl. per day from the Aux Vases at 2,915-25 ft. This well is one location east of 3 Nichols which was completed in the Waltersburg last month making 84 bbl. per day from pay at 2,144-49 ft.

INDIANA WILDCAT FAILURES

Dubois County: C. F. Robb 1 Hemmer, NE SE NW 24-3s-6w, dry, TD 450 ft.

Gibson County: Evans and Dobbs 1 Couch-Yeager, NW NE NW 5-3s-11w, dry, TD 2,455 ft.

SOUTH LOUISIANA

New Sand Cored at Ohio's Calcasieu Parish Wildcat

NEW ORLEANS.—Ohio Oil Co. has cored another oil sand in the 1 E. W. Brown, Jr., Calcasieu Parish wildcat, in which other oil sands were cored around 8,000 ft. The new sand was cored at 8,459-61 ft., and operators ran drill-stem test at 8,459 ft. A spokesman for the company asserted that the sand did not prove to be as good as the sands at higher levels. The well, ¼ mile east of the Orange city limits, is drilling ahead around 8,700 ft.

A southwesterly extension to Barataria field, Jefferson Parish, is indicated with the California Co. 17 Fleming Plantation, which is testing oil. The well flowed 83 bbl. of 37.1°-gravity oil on drill-stem test at 8,452-62 ft. Flowing pressure on the tubing was 1,200 psi. and gas-oil ratio was 1,216. Operators will continue to test the venture, which is bottomed at 10,395 ft.

The tenth core has been taken at 13,567 ft. in Gulf Oil Co. 1 Provost-Cyre Unit, Iberia Parish wildcat, which is scheduled to go to the Miocene at 14,500 ft. No shows have been encountered as yet. The venture is located 1½ miles southeast of Shell's deep production on the northeast flank of Weeks Island dome.

Off St. Mary Parish, Magnolia Petroleum Co. is attempting to bring in an oil well at its gas discovery on Block 125. Several cores were taken and found sand and shale. Operators are now drilling below 8,300 ft.

In the South Pass area, Shell Oil Co. continues to drill in the State Lease 1,008, which had slight oil shows reported. No further sands have been encountered, and operators are drilling ahead to contract depth before releasing final information.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Cameron Parish: Gas discovery—Phillips Petroleum Co. A-2 Cameron St. Lse. 1,170, offshore, Block 1, East Cameron area, TD 11,890 ft., top pay 1,671 ft., perf. 1,671-74 ft., IP: 600,000 cu. ft. gas per day, ¼-in. choke, TP 420 psi.

SOUTH LOUISIANA WILDCAT FAILURES

Calcasieu Parish: T. G. Markley 1 Sweet

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D.C. Notice is hereby given that the lands listed herein are offered through sealed bids on the terms hereinafter specified, to qualified bidders of the highest cash amounts per acre as a bonus for the privilege of leasing the lands. All bids must be submitted to the Director, Bureau of Land Management, Washington 25, D.C., on or before 1 p m. of the date set out herein. Each bidder must submit with the bid one-fifth of the amount bid in cash or by certified check on a solvent bank or by money order made payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease required under 43 CFR 192.42 (a) (2) and (a) (3), Circular 1730. The envelopes should be plainly marked that they are not to be opened before the date and hour set out herein, and should show the name of the field. No bids received after the hour fixed herein for receiving bids will be considered. The remainder of the bonus and the annual rental must be paid and an acceptable surety bond in the sum of $5000 must be furnished by a successful bidder prior to the issuance of a lease. The deposits of the other bidders will be returned upon acceptance of the successful bid. Bidders are warned against violation of section 1860, Title 18, U.S. Code, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids. Royalties payable to the United States will be at the rate of 12½ per cent. Annual rental will be at the rate of $1.00 per acre. Copies of the form of lease to be issued will be mailed upon request, or may be obtained from the offices of the Oil and Gas Supervisor, U.S. Geological Survey, 239 Federal Building, Tulsa, Oklahoma. Title to these lands was acquired by the United States, and they comprise the site of the Cactus Ordnance Works Military Reservation, Etter, Texas. Jurisdiction over the oil and gas deposits therein was transferred to the Department of the Interior under authority of Executive Order No. 9337 of April 24, 1943, by Public Land Order No. 590 of June 14, 1949. The lands are offered in six parcels described as follows: Parcel No. 1. Acquisition Tract 18: All that part of section 20, Blk. 2-T., T. & N. O. RR Survey, Moore County, Texas, lying East of U.S. Highway No. 287 and South of the County line between Moore and Sherman Counties, containing 105.87 acres, more or less. Parcel No. 2 Part of Acquisition Tract 12: The W. 891 ft. of the SW¼ of section 28, Blk. 2-T, T. & N. O. RR Survey, containing 54.00 acres, more or less. Parcey No. 3. Part of Acquisition Tract No. 10: All that part of section 29, Blk. 2-T, T. & N. O. RR Survey, Lying East of U.S. Highway No. 287, containing 451.18 acres, more or less. Parcel No. 4, 222.07 acres of Acquisition Tract No. 1, being all that part of section 36, Blk. 2-T, T. & N. O. RR Survey, lying East of Texas State Highway No. 9 (same as U.S. Highway No. 287), except 0.38 acre, described as: Beginning at a point in the East R.O.W. line of State Highway No. 9, said point being 2,507 ft. N. of its intersection with the South line of section 36; thence N. 89° 41′ E. 550 ft.; thence N. 0° 19′ E., 30 ft.; thence S. 89° 41′ W. 550 ft. to a point in the East R.O.W. line of said Highway No. 9; thence S. 0° 19′ W., a distance of 30 ft. along the East R.O.W. line of Highway No. 9, to the point of beginning. Parcel No. 5. Part of Acquisition Tract No. 2 containing four parcels of land described as: (a) Beginning at a point 106 ft. N. of SE corner of section 37, Blk. 2-T, T. & N. O. RR Survey, thence N. along the East line of said section 37; thence S. 89° 42′ W., 1,205 ft.; thence S. 0° 11′ E., 848 ft.; thence N. 89° 42′ E., 1,205 ft.; to point of beginning, containing 23.50 acres, more or less. (b) Beginning at the NW corner of section 37, Blk. 2-T., T. & N. O. RR Survey, thence S. 0° 14′ E., 1,466.66 ft. along the W. line of the said section 37; thence N. 89° 46′ E., 891 ft.; thence N. 0° 14′ W., 1,466.66 ft. to N. line of said section 37; thence W. 891 ft. along the N. line of said section 37 to point of beginning, containing 30.00 acres, more or less. (c) A tract of land in section 37, Blk. 2-T., T. & N. O. RR Survey, 150 ft. in width being 75 ft. on each side of a center line described as: Beginning at a point 891 ft. E. and S., 0° 14′ E., 1,166.66 ft. from the NW corner of section 37, thence S. 38° E., 2,390 ft.; thence N. 83° E., 360 ft.; thence S. 47° E., 1,950 ft. to a point said point being 1,165 ft. W. and 954 ft. N. of the SE corner of said section 37, and containing 15.90 acres, more or less. (d) Beginning at a 1″ iron pipe in the West line of section 37, Blk. 2-T., T. & N. O. RR Survey, said point being 105 ft. N. of the SW corner of said section; thence N. along said section 384 ft. to a point in the section line marked by 1″ iron pipe; thence S. 44° 20′ E., 538.9 ft. to a point in property line fence marked with 1″ iron pipe; thence in a Westerly direction 378.1 ft. to point of beginning, and containing 1.66 acres, more or less. Parcel No. 6. Acquisition Tract No. 3: The NW¼ and the S½ of section 38, Blk. 2-T., T. & N. O. RR Survey, except 6.60 acres in the SE corner of the S½ of section 38, lying E. of County Road conveyed to C. R. I. & G. RR Co., by instrument recorded in Vol. 46 at page 59, Deed records of Moore County, Texas, and containing 473.40 acres, more or less. Acquisition Tract No. 4: The NE¼ of section 38, Blk. 2-T., T. & N. O. RR Survey, containing 160.00 acres, more or less. Total 1,538.31 acres more or less. Bids must be submitted on or before 1 p. m., March 8, 1950. Marion Clawson, Director.

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Lake Land & Oil Co., 28-11s-7w, 4¼ mi. S-SW of Holwood townsite, dry, TD 9,504 ft.

Sohio Petroleum Co. and Chicago Corp. 1 Am. Wurmnest et al, 15-11s-8w, 1½ mi. E of South Lake Charles field, dry, TD 11,340 ft.

Jefferson Parish: California Co. 1 Dwight Jones et al, 10-17s-24e, 1 mi. NE of Lafitte production, dry, TD 11,500 ft.

Livingston Parish: Southeastern Production Co. and Gaylord Container Co. 1-L Gaylord, 9-7s-5e, 2 mi. NW of Springville, dry, TD 8,806 ft.

Plaquemines Parish: Barnsdall Oil Co. 10 Breton St. 1,504, Breton Sound Block 34, dry, TD 8,484 ft.

ILLINOIS

Active Area East of Lawrence Pool

MATTOON.—There are eight operations, testing, drilling, or locations in the area east of the southern part of Lawrence pool around the discovery well, Messmer Oil Co. 1 Ida Nesbitt, SW NE SW 21-3n-11w. The discovery well is on production test after swabbing 175 bbl. of oil and 20 bbl. of water per day from McClosky limestone at 1,890-95 ft. and 1,915-20 ft. Same operator has set casing at 2 Ida Nesbitt, NW NE SW 21-3n-11w, and is moving in rotary tools at 4 Nesbitt, one location further west. Messmer 3 Nesbitt, west offset to the discovery well, is a location. Location for the southwest offset has been staked at West Drilling Co. 2 B. E. Lewis. Illinois Mid-Continent Co. has three operations southwest of the discovery well. In the northwest corner of Section 28, Illinois Mid-Continent Co. is cleaning out to test McClosky at 1,859-66 ft. after setting casing to 1,853 ft. Same operator is drilling below 1,620 ft. at 1 School Trustees, one location to the north and has staked another location, 2 School Trustees, two locations to the north.

About ½ mile southwest of the discovery well, Dennison & Goodwin and Olds Drilling Co. 1 William Schick, SW SE SE 20-3n-11w, is moving in cable tools to test the McClosky at 1,835-53 ft.

In Clay County, Texas Co. 1 C. T. Gabbert, NW NE NW 35-4n-5e, topped the Benoist at 2,593 ft. and on a drill-stem test at 2,592-2,602 ft. had a recovery of 50 ft. of oil and 80 ft. of salt water. Another test at 2,592-2,610 ft. recovered 30 ft. of oil, 30 ft. of salty oil-cut mud and 180 ft. of salt water. Operator is drilling at 2,730 ft.

ILLINOIS WILDCAT FAILURES

Coles County: E. Zink 1 Austin, NW NW NE 1-12n-10e, dry, TD 850 ft.

E. S. Baldwin 1 Winkleblack, SW NW SW 25-12n-10e, dry, TD 754 ft.

Edgar County: J. W. Rudy 1 Stanfield, W½ NW SW 34-15n-14w, dry, TD 452 ft.

W. A. Fullenkamp 3 Barber, NE NW SE 20-13n-13w, dry, TD 480 ft.

P. M. Henderson 1-A Linder, SE NE SE 21-13n-13w, dry, TD 567 ft.

F. B. Cline 1 F. S. Webster, NE NE SW 7-12n-10w, dry, TD 2,086 ft.

Slemaker and McClintock 1 Snoddy, SW SE SW 7-12n-12w, dry, TD 506 ft.

Gallatin County: Joe Reznik 1 J. Kensall, NE NW NE 26-7s-8e, dry, TD 2,916 ft.

Hamilton County: Heller Oil Co. 1 L. Moser, SE NW SE 30-5s-7e, dry, TD 3,254 ft.

Carter Oil Co. 1 J. Steele, NW SW NE 20-6s-7e, dry, TD 3,258 ft.

Madison County: L. Turner 1 Hoxsey heirs, SW NE NW 33-6n-6w, dry, TD 575 ft.

W. O. Laswell 1 Subree, SE SE SE 33-6n-6w, dry, TD 615 ft.

W. H. Wilson 1 Smith et al, SE SW NE 8-5n-3w, dry, TD 850 ft.

Saline County: George & Wrather 1 C. M.

Bishop, SW SW NE 3-8s-6e, dry, TD 3,125 ft.

Shelby County: P. Doran 1 Abercrombie, SW SW NW 29-11n-6e, dry, TD 2,187 ft.

Wayne County: Dunbar Drilling Co. 1 Locke, SE SE NW 17-2s-9e, dry, TD 3,459 ft.

CANADIAN FIELDS

New Excelsior Field Gets Third Producer

CALGARY.—The third well in Excelsior field, located about 14 miles north of Edmonton, established a substantially higher flush flow potential than the two preceding producers, the Imperial discovery well and Rio Bravo's ½-mile southern extension. The new oil well, owned by Pacific Petroleums & Associates, with an initial potential of 1,250 bbl. daily, was the group's first producer. Located in LSD 13, 2-56-24w4, it extended the field ½ mile eastward. The D2 zone was topped at 3,840 ft., and the well was completed at 3,903 ft. after encountering 63 ft. of D2 porosity. Seven-inch casing was set at 3,853 ft. and potential test was run without acidization. Commonwealth Drilling Co. has moved rig from the first well and crew is now grading site for Pacific-Excelsior 2, LSD 12, 2-56-24w4, ¼ mile south of the No. 1.

A successful drill-stem test was run in the Devonian D2 zone at Leduc Calmar 2, with clean oil being recovered when the drill pipe was pulled, and a substantial natural gas flow rate resulting during the test period. The well, in LSD 5, 25-49-26w4, about 1¾ miles southeast of the main Leduc field, ran a 1-hour drill-stem test at bottom 5,260 ft. The gas flow rate measured over 500,000 cu. ft. daily, and when pipe was pulled fluid content was 690 ft. of clean oil. Crew is continuing to core and test.

The Bailey-Spedden 1, wildcat 75 miles east-northeast of Edmonton, has completed drilling at 3,009 ft., set 7-in. casing at 2,118 ft., and is gun perforating from 2,060-67 ft. preliminary to testing Cretaceous sands. To be tested are a sand which indicates presence of heavy oil and two sands which indicated gas-bearing horizons. The well, in LSD 5, 1-60-13w4, is backed by the Texas-Alberta Co. of New York, Tower Petroleums, Ltd., Reef Petroleums, Ltd., Calvan Petroleums, Ltd., and the A. G. Bailey Co. & Associates. At least a gas well is assured at the venture. A Cretaceous drill-stem test early this month at 1,625 ft. gave a natural gas flow rate of 750,000 cu. ft. daily through a small choke. Actual potential from this sand should be somewhat larger.

Eleven wells were completed in Alberta during the past week, boosting total completions since the beginning of the year to 66. This week's completions included 10 oil wells and 1 wildcat failure. Six of the new producers were drilled in Redwater field, three at Leduc, and one at Excelsior.

At Redwater, Imperial Oil, Ltd., placed four of the new producers on flow, to raise its total number of wells in that field to 120; the team of British American Oil Co. and the Hudson's Bay Oil & Gas Co. placed its 16th joint Redwater well on production; and the British American-Lease 64, Ltd., team successfully completed its second joint oilwell.

At Leduc, Imperial started oil flowing from another two D3 zone oil wells and the Texaco Exploration Co.-McColl Frontenac Oil Co. team placed its second southwest Leduc oil success on production.

Pacific Petroleums, Ltd., and its Excelsior associates, Sunray Oil Co., Atlantic Oils, Tower Petroleums and Calvan Petroleums, rated a substantial producer in the recently rated Excelsior D2 oil field this week.

CANADIAN WILDCAT FAILURE

Sun et al.-Calling Lake 1, LSD 13, 22-71-23w4, TD 3,250 ft.

SAFETY with COMFORT
in Hydrogen Sulphide and other TOXIC FUMES – even at 20° below zero – with Scott Air-Pak

FOR TANK GAUGING, and the multitude of other necessary duties in and near TOXIC fumes, the Scott *Air-Pak* provides complete employee breathing protection.

Using AIR—not oxygen—the Scott *Air-Pak* can safely be worn in areas with high concentration of petroleum vapors. *Air-Pak* is available in a variety of models: BACK-PAK, (illustrated)—SLING-PAK and EXTENSION HOSE ASSEMBLY, protecting any number of men for minutes or uninterrupted safe hours.

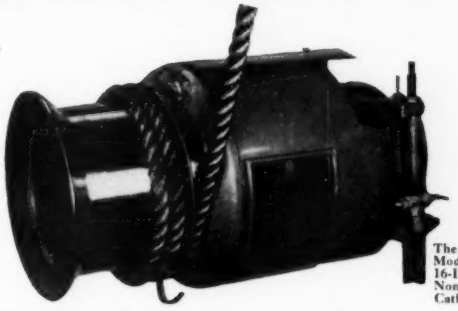
ESTABLISHED IN 1932 Scott FOR SAFETY – FOR SERVICE

Over forty-five Oil Companies now use Scott Air-Paks in their operations.

In Canada: Safety Supply Company—offices in Toronto, Edmonton, and other Principal Cities.

SAFETY EQUIPMENT DIVISION
SCOTT AVIATION CORP.
221 ERIE ST., LANCASTER, N. Y.

KELCO Safety SPINNING LINE and BREAKOUT CATHEADS



The Model 16-LH Non-Fouling Cathead

THE OUTSTANDING CATHEAD OF TODAY AND TOMORROW

Anti-Fouling Catline Spool
Completely Housed Friction Cathead
Simplicity of Design, Operation and Maintenance
Double-Plate Clutch
Anti-Friction Bearings Throughout as Recommended by Leading Bearing Manufacturers
Choice of Mechanical, Hydraulic or Air Controls

AVAILABLE THROUGH YOUR FAVORITE SUPPLY STORE

Representatives in All Fields

Be Safety Wise — KelCo-ize

KELCO BEN F. KELLEY CO., Inc.
TULSA, OKLAHOMA

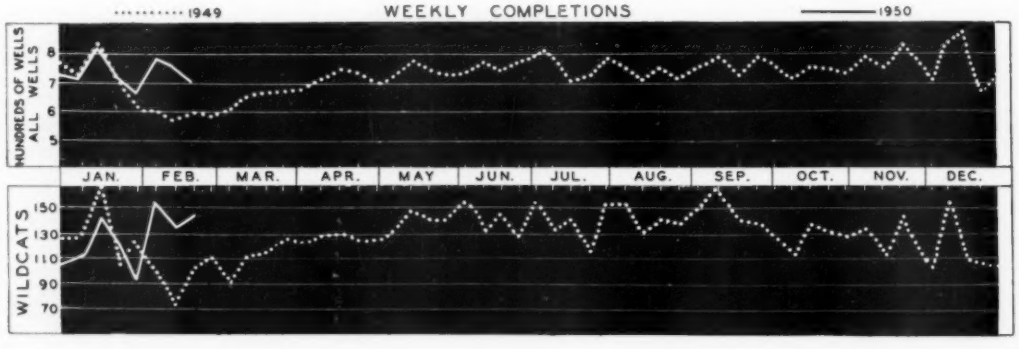
CURRENT STATISTICS

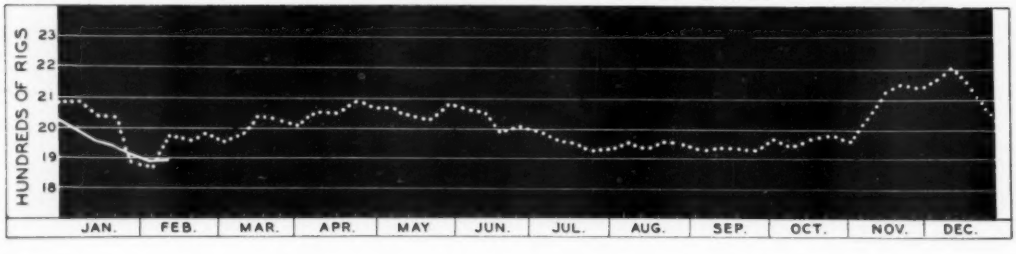
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK OF FEBRUARY 18, 1950

	Total of all wells					Feb. 18		Wildcat completions and discoveries									
													Cumulative total, 1950				
	Comp.	Oil	Gas	Dry	Footage	1950	1949	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	12	6	0	*6	16,803	97	148	0	0	0	0	0	0	0	0	0	0
Pennsylvania	21	8	2	†11	34,600	153	247	0	0	0	0	0	0	0	0	0	0
West Virginia	9	1	7	1	26,751	75	72	0	0	0	1	1	0	0	2	2	4
Ohio	21	6	6	‡9	52,074	124	159	0	0	0	0	0	1	0	0	2	3
Indiana	28	11	1	16	40,897	137	124	0	0	0	2	2	5	0	1	13	19
Kentucky	12	3	2	7	17,096	111	99	0	0	0	0	0	2	0	0	9	11
Illinois	38	17	0	21	81,261	308	281	0	0	0	16	16	4	0	0	75	79
Michigan	9	4	0	5	22,431	101	129	0	0	0	4	4	6	0	0	37	43
Kansas	60	28	6	§26	183,791	441	375	1	0	0	7	8	11	0	0	63	74
Neb., Mo., Iowa	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	5	5
Oklahoma	96	66	3	‡27	374,906	633	439	6	0	0	14	20	22	2	2	78	104
Texas	287	179	10	98	1,199,554	2,059	1,617	13	0	4	49	66	56	5	23	299	383
North Central (Dist. 7-B & 9)	91	46	3	§42	266,849	611	498	6	0	3	17	26	19	1	7	93	120
West (Dist. 7-C & 8)	94	69	0	25	467,689	586	349	3	0	0	16	19	15	1	0	72	88
Panhandle (Dist. 10)	13	11	2	0	39,371	168	179	0	0	0	0	0	1	0	2	4	7
Eastern (Dist. 5, 6, & 6-P)	10	7	0	3	51,841	141	85	0	0	0	3	3	2	1	1	31	35
Gulf Coast (Dist. 2 & 3)	37	27	2	8	210,321	282	247	1	0	0	3	4	8	1	3	36	48
Southwest (Dist. 1 & 4)	42	19	3	20	163,483	271	259	3	0	1	10	14	11	1	10	63	85
Louisiana	35	21	1	13	210,692	350	299	1	0	1	7	9	11	4	3	29	47
Northern	20	13	0	7	75,885	187	162	1	0	0	2	3	3	0	0	16	19
Southern	15	8	1	6	134,807	163	136	0	0	1	5	6	8	4	3	13	28
Arkansas	7	5	0	2	24,248	51	27	0	0	0	1	1	0	0	0	15	15
Mississippi	7	3	0	4	52,182	44	44	1	0	0	4	5	1	1	0	12	14
Southeastern States	1	0	0	1	207	8	6	0	0	0	1	1	0	0	0	5	5
Montana	1	0	0	1	3,062	19	22	0	0	0	0	0	0	0	0	5	5
Wyoming	6	4	0	2	22,428	84	71	0	0	0	1	1	3	0	0	13	16
Colorado-Utah	0	0	0	0	0	17	21	0	0	0	0	0	0	0	0	12	12
New Mexico	13	9	0	4	65,206	99	73	1	0	0	1	2	5	0	0	8	13
California	38	28	1	9	164,489	240	355	0	0	0	8	8	4	0	1	42	47
Dakotas	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1
Total United States	701	399	39	263	2,592,678	5,161	4,608	23	0	5	116	144	131	12	32	725	900
Total previous week	753	435	43	275	2,869,217			13	2	2	117	134	108	12	27	609	756
Total February 19, 1949	600	357	44	199	2,101,564			10	4	3	85	102	113	9	21	665	808

Service wells included: *6, †8, ‡1, §2.





DAILY AVERAGE PRODUCTION FOR WEEK

	Feb. 11 crude oil	B. of M. Feb. demand	Feb. 4 crude oil
Alabama	1,600	1,500	1,750
Arkansas	80,200	82,000	79,700
California	856,400	832,000	867,500
Colorado	61,900	67,000	60,900
Eastern	59,200	59,900	58,600
Florida	975	1,000	1,000
Illinois	180,900	180,000	176,700
Indiana	27,400	29,000	27,200
Kansas	285,750	290,000	265,500
Kentucky	24,700	24,000	25,600
Louisiana	545,950	542,000	545,450
North Louisiana	120,050		119,550
South Louisiana	425,900		425,900
Michigan	44,800	45,000	43,200
Mississippi	98,150	99,000	95,750
Montana	23,500	25,000	24,000
Nebraska	1,650	700	1,650
New Mexico	130,800	130,000	130,800
Oklahoma	425,700	415,000	416,400
Texas	1,916,500	2,170,000	1,916,500
Dist. 1 (Southwest)	25,625		25,625
Dist. 2 (Southwest)	110,575		110,575
Dist. 4 (Southwest)	178,800		178,800
Dist. 3 (Gulf Coast)	364,625		364,625
Dist. 5 (Eastern)	32,000		32,000
Dist. 6 (Eastern)	80,800		80,800
East Texas field	214,800		214,800
Dist. 7-C (West)	46,900		46,900
Dist. 8 (West)	582,475		582,475
Dist. 7-B (W. Central)	62,000		62,000
Dist. 9 (N. Central)	128,900		128,900
Dist. 10 (Panhandle)	89,000		89,000
Utah	2,500	1,200	2,500
Wyoming	135,100	126,000	130,100
Total United States	*4,913,675	5,120,000	4,870,800
Change from previous week, up	42,875		
Canada	63,265		60,015

Total U. S. production January 1-February 18 †242,813,445 bbl.
Same period last year (crude plus cond.) 269,020,825 bbl.

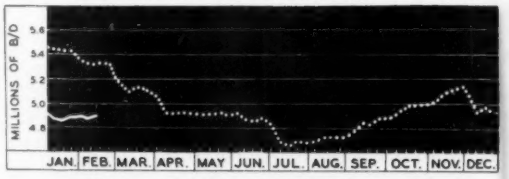
*Not incl. 93,295 bbl. condensate. †Incl. 4,503,205 bbl. condensate.

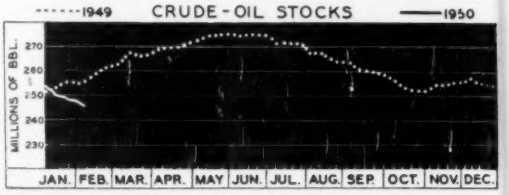
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

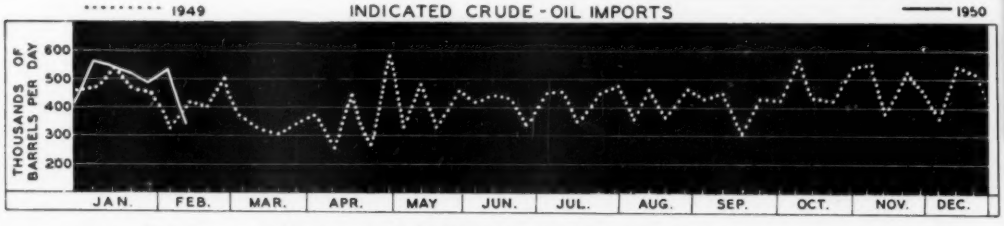
(Thousands of barrels)

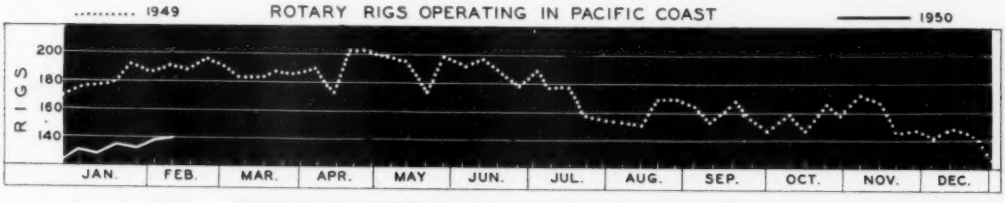
	Feb. 11, 1950	Feb. 4, 1950	Feb. 12, 1949
Pennsylvania Grade	2,772	2,726	2,806
Other Appalachian	1,706	1,824	1,369
Illinois, Indiana, Michigan	11,434	11,376	13,781
Arkansas	3,048	3,000	3,190
Louisiana	14,692	14,610	12,548
North	3,651	3,630	3,450
Gulf	11,041	10,980	9,098
Mississippi	2,569	2,529	2,881
New Mexico	7,204	7,171	6,755
Oklahoma and Kansas	35,430	35,722	35,980
Texas	109,433	110,985	122,865
East Texas	14,779	15,029	15,711
West Texas	38,149	38,881	50,439
Texas Gulf	29,800	30,316	29,596
Other Texas	26,714	26,759	27,119
Rocky Mountain	13,169	13,183	12,725
California	37,292	37,334	33,395
Foreign	6,692	7,657	8,604
Total United States	245,450	248,117	256,899

*Bureau of Mines.









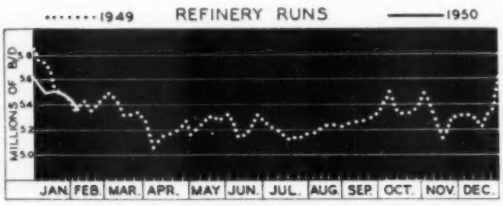
A.P.I. REFINERY REPORT, FEBRUARY 11

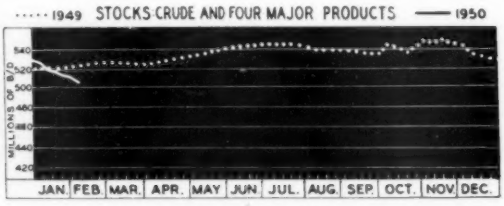
(Thousands of barrels)

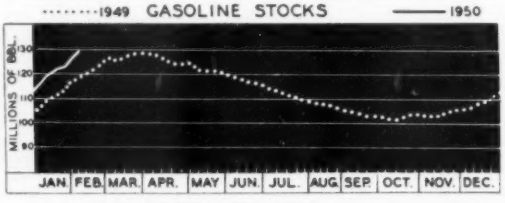
District—	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual
East Coast	831	367.3	31.7	181.3	230.8	26,452	8,485	21,790	11,159
Appalachian:									
District 1	85	40.1	7.9	15.4	11.6	2,797	369	608	286
District 2	60	25.9	6.7	8.6	13.7	1,100	131	193	124
Ind., Ill., Ky.	981	486.4	63.7	178.1	178.9	26,531	2,961	7,702	3,281
Okla., Kans., Mo.	446	256.9	17.9	85.6	64.0	13,731	564	3,245	957
Inland Texas	191	142.3	10.1	23.3	38.6	4,152	336	730	574
Texas Gulf Coast	1,229	575.2	103.6	180.7	245.6	18,754	1,779	10,675	5,896
La. Gulf Coast	420	175.0	64.1	85.0	45.9	7,202	1,291	3,296	2,210
N. La. and Ark.	79	25.4	7.3	11.1	14.4	3,461	205	442	296
Rocky Mountain:									
New Mexico	12	6.1		1.9	2.7	94	25	75	35
Other Rocky Mtn.	164	76.4	6.1	29.0	38.9	4,578	187	1,371	546
California	864	378.3	13.3	163.0	356.8	20,410	787	10,475	27,501
February 11, 1950	5,362	2,555.3	332.4	963.0	1,241.9	129,362	17,120	60,602	52,865
February 4, 1950	5,420	2,547.1	359.0	1,047.9	1,160.1	127,437	18,095	64,039	54,590
February 12, 1949	5,447	2,536.3	355.0	1,112.3	1,282.0	119,780	20,389	57,496	61,264

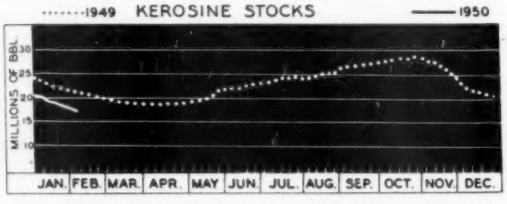
Bureau of Mines, February 1949	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
	801	319.6	34.9	162.5	209.2
	99	43.5	6.0	11.8	13.3
	68	33.6	4.8	6.2	17.5
	890	446.5	56.8	142.7	169.0
	436	223.6	26.2	84.8	73.9
	232	151.0	16.9	18.4	54.5
	1,389	616.7	90.6	278.8	243.6
	429	185.1	53.8	99.4	61.9
	72	28.1	9.3	8.0	15.6
	10	5.4	.4	1.3	2.9
	152	66.2	3.9	26.7	39.0
	902	364.2	10.3	163.5	381.9
	5,480	2,483.5	313.9	1,004.1	1,282.3

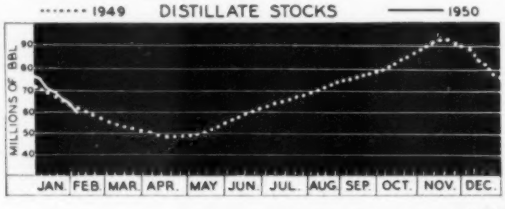
*At refineries including natural blended. †Finished and unfinished.

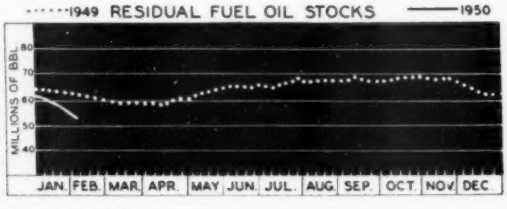


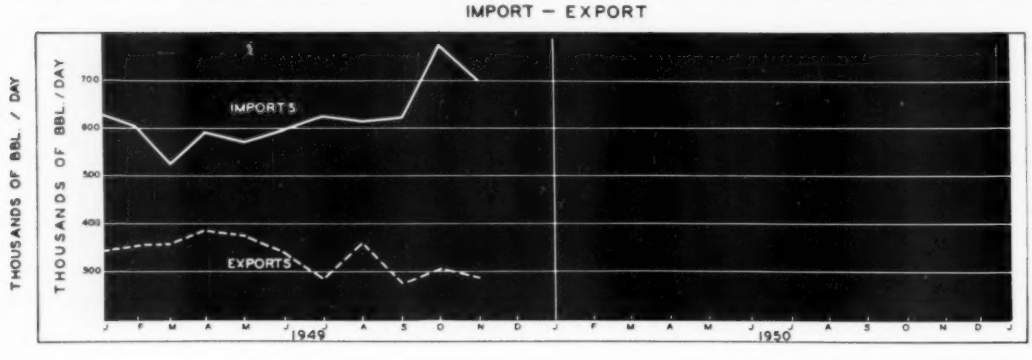












CRUDE PRICES
GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.53			
19-19.9	1.63			
20-20.9	1.73	$2.25		$2.12
21-21.9	1.82	2.27		2.14
22-22.9	1.92	2.29		2.16
23-23.9	2.02	2.31		2.18
24-24.9	2.12	2.33	$2.56	2.20
25-25.9	2.22	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. Above changes do not include recent reductions of a few buyers applying principally to low-gravity grades.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.85
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.54
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

GROUP 3 product prices remained steady during the past week except for natural gasoline. Following an earlier drop of ⅜ cent, Grade 26-70 lost another ½ cent bringing the Group 3 price down to 5 cents a gallon and North Texas to 4½ cents. It was at about this same time last year that natural-gasoline prices broke, going from 8½ cents a gallon in the last week of January to 5 cents by the middle of March.

Other Group 3 prices changed very little during the week. Gasoline is readily available but there has been no indication of distress selling. This is probably accounted for by the fact that withdrawals of light fuels from storage have more than offset increases in gasoline stocks. For the combined Mid-Continent and North Central districts, clean-product inventories are 1,355,000 bbl., or 2.4 per cent less than at the same time last year. Heavy-fuel stocks are down 3,155,000 bbl. from a year ago. Mid-Continent residual stocks dropped below a million barrels on Feburary 11, indicating that most shipments from the district now are coming out of current production.

The trend toward softer distillate markets continued on the East Coast. Most suppliers in New York Harbor were quoting 7.6 cents a gallon for No. 2 in barge lots. In some cases, postings remained at 7.9 cents but voluntary allowances of .3 cent brought quotations to the general market level. Kerosine offerings continued at 9 cents and heavy fuel remained unchanged at $2.05 a barrel.

Distillate yields at Gulf-East Coast refineries dropped to about 18 per cent for the week ended February 11 compared with better than 21 per cent in January.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of February 20, 1950. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Tex. Gulf Coast
Regular gasoline, 74-76 octane	9⅜-9⅞	10.5-10.6	9-9¾
Premium gasoline, 78-80 octane	10⅜-10⅞	11.5-11.6	9¾-10¾
42-44 w.w. kerosine	8½-8¾		8-8½
No. 2 straw fuel oil	7⅝-7⅞	7.6	6¾-7
No. 6 residual	$1.45-1.55	$2.05	$1.65-1.75

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5	4½	4¾
Grade 18-55	6	5.4	5.7

LUBRICATING OILS
South Texas

200 vis., No. 2-3 neutral	10.5
750 vis., No. 3-4 neutral	12.75
2,000 No. 5-6 neutral	14-14.5

LUBRICATING OILS
Mid-Continent

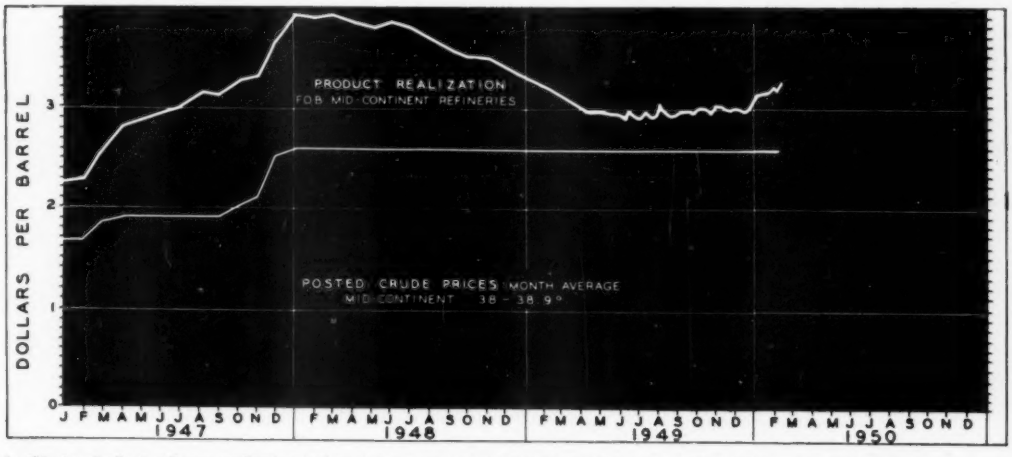
150-160 vis., D bright stock, 0-10 pp.	17
200 vis., No. 3 neutral, 0-10 pp.	11.5-13

Western Pennsylvania

145-155 vis., 10 p.t. bright stock	19.5-20.5
180 vis., 0 p.t. neutral	20.5-21.5

WAX
Mid-Continent

132-134 A.M.P.	4.25


DOLLARS PER BARREL
PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES 1 MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
0
1
2
3
J F M A M J J A S O N D
1947
F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil

N. Central Texas

(Continued from page 225)

114 bbl. of 43°-gravity oil in 6 hr., ½-in. choke, GOR 592 cu. ft., TP 85 psi., Bend conglomerate 5,972-6,000 ft.

Coleman County: Anzac Oil Corp. 1 Ben S. Pope, Blk. 87, League 703, Burnet CSL, 1½ mi. W Valera, TD 2,905 ft., elev. 1,851 ft., PB 2,837 ft., flowed 1,677,000 cu. ft. of gas, lower Fry sand 2,810-40 ft., shut-in pressure 950 psi.

United North & South Development Co. 3 R. M. Freeman, J. H. Gibson Sur. 5, 3½ mi. S Novice, TD 2,695 ft., PB 2,575 ft., 716,000 cu. ft. of gas, perfs. King sand 1,958-73 ft., shut-in pressure 650 psi.

Haskell County: New field — Sojourner Drilling Co. 1 W. P. Crouch, 27-1-H&TC, 3 mi. W Haskell, TD 5,225 ft., elev. 1,574 ft., Strawn sand 5,192 ft., pay 5,202-25 ft., flowed 250 bbl. of 36°-gravity oil a day, ½-in. choke, GOR 665 cu. ft., CP 600 psi., TP 85 psi.

Jack County: Russell Maguire 1 E. C. Richards, T. Martinez Sur., A-388, 6 mi. S Jacksboro, TD 5,338 ft., pay 5,321 ft., flowed 42 bbl. of 42°-gravity oil in 20 hr., 4/64-in. choke, GOR 900 cu. ft., CP 400 psi., TP 175 psi.

Jones County: Thompson Bros. 1 B. J. Rutledge, Lot 32, Sec. 2, Blk. 20, T&P Sur., 4 mi. S Hawley, TD 1,934 ft., elev. 1,620 ft., top lime pay 1,930 ft., pumped 46.6 bbl. of 36°-gravity oil a day.

Parker County: Extension—Farris Oil Co. 1 J. P. Hart heirs, E. A. Fleming Sur., A-457, 2 mi. SW Springtown, TD 3,659 ft., elev. 951 ft., flowed 2,530,000 cu. ft. of gas and 12 bbl. of 40.7°-gravity oil a day, 5/16-in. choke, perf. Caddo 3,541-74 ft. and 3,585-3,619 ft.

Extenston—Rowan Oil Co. et al 2 T. B. Sanders, Blk. A, I&GN Sur. 3, A-1790, 5 mi. SW Weatherford, TD 5,079 ft., perf. Marble Falls 4,992-5,002 ft., 5,500,000 cu. ft. of gas a day, shut-in pressure 1,918 psi.

Shackelford County: Extension—Great Expectations Oil Corp. 3-B Chloe A. Nail, 126-1-ETRR, 15 mi. NW Albany, TD 1,347 ft., elev. 1,541 ft., pay 1,340 ft., pumped 40½ bbl. of 36.6°-gravity oil a day.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Neeld & Hood Drilling Co. 1 M. H. Vieth, Lot 40, Blk. 3, Clark & Plumb Subd., 3 mi. S Scotland, dry, TD 3,850 ft.

Reno Oil Co. 1 Wilson-Block 64, Blk. 64, ATNCL Sur., 10 mi. N Archer City, dry, TD 3,988 ft., sand with oil show 3,905-08 ft., 3,951-69 ft.

Brown County: Central Texas Gas Co. 1 W. N. Cason, Sec. 5, ETRR Sur., 8 mi. NE Brownwood, dry, TD 2,842 ft., elev. 1,579 ft., Caddo 1,604 ft., Ellenburger 2,358 ft.

K. F. Raney 1 E. E. Robertson, Sec. 3, SA&MGRR Sur., 2½ mi. NW Thrifty, dry, TD 1,850 ft., elev. 1,480 ft., Fry and 1,317 ft., Caddo 1,725 ft.

Clay County: G. W. Cooper 1 Phillips, Blk. 5, C. Thompson Sur., A-444, 4 mi. N Joy, dry, TD 5,912 ft., elev. 993 ft.

Comanche County: Amburgy-Kerner 1 Dud Hicks, Thebold Sur., A-196, dry, TD 3,574 ft., elev. 1,410 ft., Caddo 1,722 ft., Barnett 2,530 ft., Mississippian 2,648 ft., Ellenburger 2,840 ft.

Cooper Drilling Co. 1 L. C. Redwine, A. L. Eaves Sur., 2 mi. W Sidney, dry, TD 2,966 ft., elev. 1,476 ft., Barnett 2,637 ft., Ellenburger 2,750 ft.

Cooke County: W. P. Luse and P. E. Payton 1 W. P. Luse, McKinney & Williams Sur., A-778, 4 mi. SW Hood, dry, TD 2,955 ft., elev. 876 ft.

Jack County: Warren Oil Corp. 1 Cable-Smith, Lot H, M. Putman Sur., A-465, 2 mi. SW Shannon, dry, TD 6,325 ft., Mississippian 6,125 ft., Ellenburger 6,144 ft.

Jones County: J. C. Drilling Co. 1 R. H. Myatt, Sec. 6, A. Bell Sur., 2½ mi. S Nugent, dry, TD 1,919 ft., elev. 1,610 ft.

D. M. Myatt and W. B. Koch, Jr., 1 D. M. Myatt, 1-15-T&P, 7 mi. S Leuders, dry, TD 1,750 ft.

Roark, Hooker & Roark et al 1 Dr. A. R. Thomason, 54-18-T&P, 2 mi. N Noodle, dry, TD 1,451 ft.

Montague County: The Texas Co. 1 Anna McFall, J. B. Robertson Sur., A-1548, 8 mi. SW Bowie, dry, TD 6,987 ft.

Nolan County: Park & Grimes Exploration Drilling Co. 1 R. M. Simmons, 52-21-T&P, 3 mi. SE Sweetwater, dry, TD 6,296 ft., elev. 2,140 ft., Dotham 3,185 ft., Flippen 3,598 ft., Strawn 5,930 ft., Mississippian 6,185 ft., Ellenburger 6,259 ft.

Shackelford County: Humble Oil & Refining Co. 1 F. G. Coates Trustee "C," 33-13-T&P, 9½ mi. E Nugent, dry, TD 2,335 ft., elev. 1,761 ft., bailed 90 bbl. oil, some water, from perf. 1,773-77 ft., swabbed dry, acidized and recovered all water.

West Penn Drilling Co. 1 G. R. Davis, 10-13-TP, 12 mi. W Albany, dry, TD 1,853 ft., elev. 1,766 ft.

Stephens County: Tiger Minerals, Inc., 2 J. S. McDowell, 93-6-T&P, 7 mi. N Ranger, dry, TD 4,212 ft., Caddo 3,362-3,568 ft., Marble Falls 3,772 ft., lime 4,056 ft.

Taylor County: Robinson-Puckett, Inc., 1 Henry T. Webb, Sec. 3, W. F. Sparks Sur., A-509, 3½ mi. W Bradshaw, dry, TD 5,195 ft., elev. 2,041 ft., Coleman Junction 1,680 ft., Dotham 2,190 ft., Saddle Creek 2,550 ft., coal 2,590 ft., Flippen 2,620 ft., Gunsight 2,990 ft., Home Creek 3,480 ft., upper Caps 4,220 ft., lower Caps 4,445 ft.

Permian Basin

(Continued from page 230)

Upton County: New field—Humble 1 Ralph Pembrook, 660 ft. from N, 2,247 ft. from E lines, 1-X-C. C. DeWitt Sur., 6 mi. N Benedum area, TD 12,660 ft., PB 7,169 ft., elev. 2,714 ft. perf. Sprayberry 7,080-7,100 ft., pumped 34.3 bbl. of 38.6°-gravity oil a day, GOR 517 cu. ft., Strawn 10,672 ft., Devonian 11,637 ft., Silurian 1,080 ft., Sufflemin 12,273 ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Borden County: N. G. Penrose and George P. Livermore 1 Matthew Baird Est., NW NW 37-30-J. H. Gibson Sur., dry, TD 8,560 ft., elev. 2,525 ft., Pennsylvania 7,940 ft., Mississippian 8,320 ft., Ellenburger 8,480 ft.

Coke County: Amerada Petroleum Corp. 1 March Ranch, NE NE 72-16-H&TC, 10 mi. NE Sanatorium, dry, TD 7,453 ft., elev. 2,338 ft., Clear Fork 1,095 ft., Wichita Albany 2,142 ft., Valera 2,745 ft., Wilfcamp 3,325 ft., Pennsylvanian 4,035 ft., Strawn 6,436 ft., Ellenburger 7,054 ft.

Concho County: Lamb & Ford Drilling Co. 1 Rice, Sec. 18, R. W. Hoskins Sur., 4 mi. NW Melvin, dry, TD 2,000 ft.

Kimble County: R. F. Schoolfield 1 G. F. Rust, BS&F Sur. 42, 16 mi. NW Junction, dry, TD 2,610 ft., elev. 2,179 ft., lime 2,040 ft., Ellenburger 2,595 ft.

Pecos County: Hunt Oil Co. 17 Elsinore Royalty Co., 83-D-GC&SF, 12 mi. S Fort Stockton, dry, TD 2,513 ft., elev. 3,334 ft.

Hunt Oil Co. 18 Elsinore, 80-D-GC&SF, 12 mi. S Fort Stockton, dry, TD 2,264 ft., elev. 3,468 ft.

Tex-Harvey Drilling Co. 1-A Morris Monroe, 40-1-I&GN, 6½ mi. N Sheffield, dry, TD 8,884 ft., elev. 2,218 ft., Yates 890 ft., Strawn 6,950 ft., Silurian 7,786 ft., Ellenburger 8,640 ft.

Reeves County: Gulf Oil Corp. and Jack Frost 1 P. G. Northrup, 32-50-T&P, 8 mi. NE Verhalen field, dry, TD 5,367 ft., elev. 2,832 ft., black lime 5,200 ft.

Runnels County: Woods Drilling Co. 1 Carrie M. Dale, ELRR Sur., 1½ mi. NW Jimburt field, 2 mi. SE Winters Strawn discovery, dry, TD 4,686 ft., elev. 1,804 ft., Saddle Creek 2,191 ft., Gunsight 2,451 ft., Home Creek 2,974 ft., lime 3,945 ft.

Scurry County: Seaboard Oil Co. 1 Bart Bransom, 258-97-H&TC, 10 mi. W Snyder, 2 mi. N Diamond M production, dry, TD 7,983 ft., elev. 2,497 ft., Pennsylvanian 7,046 ft., Mississippian 7,950 ft.

Sterling County: Vickers Petroleum Co. 1 Nora F. Coulson, NE NE 14-13-SP, 8 mi. S Sterling City, dry, TD 5,718 ft., elev. 2,443 ft., San Andres 1,745 ft., San Angelo 2,340 ft., Clear Fork 2,465 ft., Wichita Albany 3,445 ft.

Sutton County: Alaska Steamship Co. et al 1-E George F. Allison est., 25-K-GH&SA, 20 mi. NE Sonora, ½ mi. SE Roberts gas well, dry, TD 4,650 ft., elev. 2,318 ft., Strawn 4,550 ft.

Tom Green County: M. E. Davis 2 Robert Currie Jones, 3-A-J. W. Blue Sur., 3½ mi. W Susan Peak field, dry, TD 5,125 ft., elev. 2,128 ft., Pennsylvanian 3,970 ft., Strawn 4,970 ft.

LaGloria Corp. 1 Orville Sparks, Sec. 166, Dist. 11, SPRR Sur., 6 mi. SE Wall, 2 mi. NE Susan Peak field, dry, TD 4,694 ft., elev. 2,083 ft., Strawn 4,670 ft.

Parker Petroleum Corp. 1-A Harris est., 75-6-H&TC, dry, TD 1,872 ft., elev. 2,548 ft.

Sun Oil Co. 1 F. A. Braden, Sec. 90, Dist. 11, SPRR Sur., 9½ mi. SE San Angelo, 10½ mi. N Susan Peak field, dry, TD 5,448 ft., elev. 1,852 ft., sand 4,325 ft., Strawn reef 4,594 ft., white lime 4,632 ft., Ellenburger 5,300 ft.

SOUTHEASTERN NEW MEXICO

HOBBS. — Magnolia Petroleum Co. 1-D Santa Fe-Pacific, 22-9s-36e, ½-mile north extension attempt to Crossroads field, Lea County, reported a show of oil in a shallow zone. A drill-stem test from 4,855-4,910 ft., open 1 hour and 45 minutes, recovered 60 ft. of heavily oil and gas-cut mud, plus 120 ft. of drilling mud. Shut-in pressure was 285 psi. A second test from 4,910-60 ft. recovered 120 ft. of drilling mud.

Amerada Petroleum Corp. 1 J. E. Simmons, NW NW 11-12s-33e, southwest extension test to Bagley field, was drilling below 9,115 ft., following two drill-stem tests. From 9,010-60 ft., open 4 hours, gas came to the surface in 26 minutes and recovery was 450 ft. of heavily oil and gas-cut mud, plus 200 ft. of 45°-gravity oil. Flowing pressure was 200 psi. A 4-hour test from 9,066-85 ft. had gas in 3 hours and 18 minutes, and recovered 1,350 ft. of salt water, plus 90 ft. of gas-cut salt water. Flowing pressure was 1,800 psi.

Gulf Oil Corp. 1 L. R. Chamberlain, wildcat 13½ miles northeast of Lovington in the NW NE 14-15s-37e, stopped at 11,523 ft., total depth, to run casing. A core from 11,515-523 ft. recovered 8 ft. of dolomite with scattered bleeding of oil, and a drill-stem test from 11,509-523 ft., open 6 hours and 25 minutes, had gas in 90 minutes, mud and water blanket in 2 hours and 25 minutes and flowing oil in 3 hours and 25 minutes. The well flowed 143 bbl. of 48°-gravity oil in 3 hours, plus 1,150,000 cu. ft. of gas. Recovery in the pipe was 2,650 ft. of oil. Flowing pressure was 2,499 psi., and 4,200 psi. shut in.

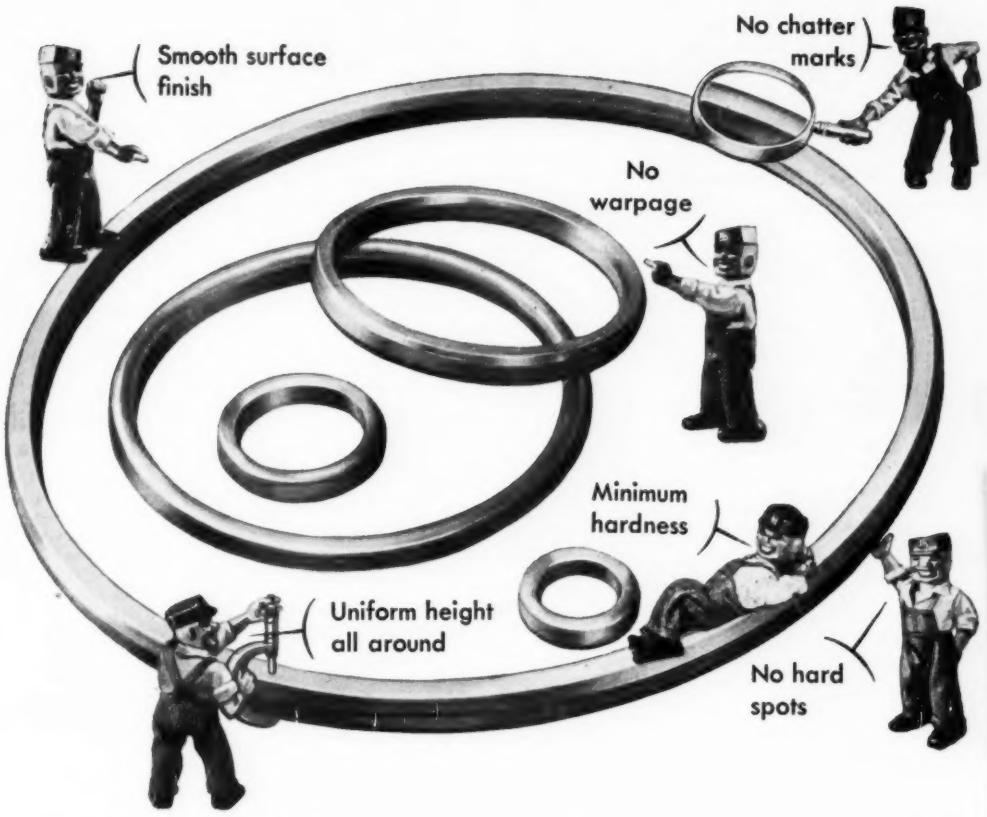
On elevation of 3,797 ft., top of the Devonian was 11,507 ft., which checked about 250 ft. low to the Denton discovery well.

SOUTHEAST NEW MEXICO SUCCESSFUL WILDCAT

Lea County: Stanolind Oil & Gas Co. 1-A Anna Foster, NW SE 23-19s-38e, 2 mi SE Hobbs field, TD 8,021 ft., PB 7,560 ft., elev. 3,616 ft., San Andres 4,305 ft., Gloyd 5,580 ft., Tubbs 6,590 ft., Devonian 7,945 ft., pumped 44 bbl. of 33°-gravity oil, no water, GOR 1,500 cu. ft., CP 490 psi., Drinkard sand open hole 7,312-7,560 ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Lea County: Stanolind 1 Will Terry, NW SW 26-19s-38e, 2 mi. S Hobbs field, dry, TD 9,670 ft., elev. 3,608 ft., San Andres 4,270 ft., Glorietta 5,569 ft., Tubbs 6,540 ft., Drinkard 6,950 ft., Devonian 7,840 ft., Montoya 9,040 ft., Simpson 9,305 ft., McKee 9,605 ft.



Made "soft" for proper flow ... Made accurate for perfect fit!

Goetze V-Tite Gaskets for ring-type joint flanges

One sure way to tell quality in a gasket designed for ring-joint flanges is to check the hardness. In Goetze V-Tites, carefully controlled heat treatment during fabrication keeps hardness down to a minimum. The hardness of a Goetze soft iron V-Tite Gasket, for example, does not exceed 90 Brinell.

And because each gasket is uniformly "soft" throughout (you'll find no hard spots in a Goetze V-Tite), proper flow or seating of the gasket, without damage to flange surfaces and with minimum bolt stresses, is always assured.

Dimensional accuracy is also important in a ring-type gasket. Here, too, Goetze V-Tites meet high precision standards. They are of uniform height all around . . . free of warpage . . . have the same center-to-center measurements top and bottom . . . other tolerances are well within API and ASA specifications to assure a perfect fit in the flange grooves.

In addition to soft iron, Goetze V-Tite Gaskets are made in a number of alloys in all standard ASA and API shapes and sizes. Gaskets of special dimensions are also available. For further details, write for Catalog PK-35A. Johns-Manville, Box 290, New York 16, N. Y.

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THERE'S A JOHNS-MANVILLE PACKING OR GASKET FOR EVERY SERVICE

EQUIPMENT MEN ... in the News

Gunby Named Manager of Cementing Equipment Sales

D. F. GUNBY

L. L. Rector, president, Rector Well Equipment Co., Inc., Fort Worth, manufacturer of well-head and cementing equipment, has announced the appointment of D. F. Gunby as manager of cementing-equipment sales and service with headquarters in Fort Worth.

Gunby, who majored in petroleum production engineering at University of Oklahoma, is well known in the Mid-Continent and Gulf Coast areas where he has been engaged in production engineer, sales engineering, and more recently in consulting work. He has been associated in the past with the Phillips Petroleum Co., Petroleum Administration for War, and Climax Engineering Co.

Holland Is Factory Sales Representative of Federal

J. R. HOLLAND

Appointment of J. Ross Holland as factory sales representative for Federal Motor Truck Co. in the Oklahoma region has been announced by Carl Loud, general sales manager.

Holland will supervise dealer relations and sales activities for Oklahoma and northern Texas from his Oklahoma City headquarters. He brings a background of more than 15 years in sales work to his new post.

Advertising Firm Advances Davenport and Wilde

Clarence G. Davenport, associated with McCarty Co., of Los Angeles, since 1930, and Willard H. Wilde, manager of McCarty's San Francisco office since 1939, have both been named vice presidents of the organization.

Davenport, a graduate of Harvard College, has been identified with all phases of the agency's operation, and his new executive function will place him in charge of research and the development of client plans and campaigns.

Wilde, a graduate of University of California, started with McCarty in San Francisco in 1939 as an account executive, becoming manager 3 years later.

McGara Made Manager of Porter Pittsburgh Plants

J. L. McGARA

T. M. Evans, president, H. K. Porter Co., Inc., has announced appointment of John L. McGara as general manager, Pittsburgh district operations of the company. McGara is to have charge of sales and operations of the three Porter plants in the Pittsburgh district; the Porter plants at Lawrenceville, Pa., where Quimby pumps and the Porter line of mixing and blending equipment are manufactured; and the two plants of the American Division at Lawrenceville and at McKees Rocks, Pa.

R. G. Freeman Joins Ideco Sales Division

T. D. Collins, vice president, Ideco Supply Stores Division, International Derrick & Equipment Co., recently announced that Rodney G. Freeman, Jr., has joined his sales division. He will office in the new Dresser Building at Houston.

Freeman is a graduate of Mississippi State College where he studied mechanical engineering. He has spent considerable time in the oil fields and oil-field manufacturing plants. He will work in the South Texas and Louisiana areas.

Disler Rejoins Pacific

After an absence of 18 months, Ed. W. Disler has again become associated with Oil Well Plunger Pump Division of Pacific Pumps, Inc., Huntington Park, Calif. Disler will be the Plunger Pump Northern division manager, with headquarters at Oildale, Calif.

Tulsa Tube Turns Moves

The Tulsa office of Tube Turns, Inc., has been moved from South Detroit Avenue to 420 Wright Building. Robert S. Tyler, Jr., is manager of the company's Tulsa office.

Lewin Given Promotion By Ralph B. Carter Co.

F. E. LEWIN

Fred E. Lewin, vice president, has been promoted to the position of executive vice president and general manager, it has been announced by Ralph B. Carter, Jr., president of the Ralph B. Carter Co., Hackensack, N. J.

Lewin, who has been with Carter for nearly 15 years, was sales manager for the pump division and then appointed to vice president in charge of all sales. Ralph B. Carter Co. manufactures Humdinger pumps for contractors and oil-field use. •

Shugart Opens Seismic Service Office in Dallas

Thomas R. Shugart, formerly vice president of Geotechnical Service Corp., has announced the opening of his offices to serve as geophysical consultant, specializing in seismic interpretations and in seismic supervision. His offices, which opened February 15, are located in the Mercantile Securities Building, Dallas.

Olson to Direct Morse Decals New York Office

B. G. Olson, formerly general sales manager of Morse Decals, Inc., Los Angeles, has been placed in charge of the newly opened office of the company in New York.

Olson, well known in the petroleum industry, will cover the eastern states. The company produces decal identification for a number of petroleum companies.

Indian Drilling Mud Opens Warehouse at Hobbs, N. M.

Indian Drilling Mud Co., Britton, Okla., has announced the opening of a new warehouse at Hobbs, N. M. Don Kimbell, district enginer, will be in charge of the new location. The company has appointed Builders Sup-

(Continued on page 244)

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

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UNDISPLAYED CLASSIFIED 12c a word one issue. 10% Discount three or more issues. $3.00 minimum charge. Blind Box in our care counts nine words. Payable in Advance.

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EQUIPMENT FOR SALE

ROLAGRIP COUPLINGS—For Sale, Approximately 40 tons, 1½" to 3½" Line Pipe Size. New, never used, complete with nuts, bolts and neoprene gaskets. Price 50% less than manufacturers selling price. Send for list. JULIUS M. FOGELMAN, Reading, Pa.

FOR SALE: 1—36-L Bucyrus Rig, 1948 model, complete with all tools. Phone 2032, Henderson, Kentucky.

FOR SALE: One Wilson Mogul Double Drum rig, complete with 98' L. C. Moore derrick and 14" Bethlehem pump. In excellent repair, drilling capacity 6,000'. Will sell with or without 4,000' 3½" modified drill pipe. Priced for immediate delivery $52,000.00, subject to prior sale. Mack Well Servicing Company, P. O. Box 29, Alice, Texas.

FOR SALE: Used Cooper Skid Model E well servicing unit, mounted on 6X6 GMC with new motor and good rubber. With or without 8 X 10 X 60 ft. mast and tools. Unit located at Seminole, Okla., Box D-388, The Oil and Gas Journal, Tulsa, Oklahoma.

NEW casing, 936 ft. 5½-15 lb. J55-Range 1—$1.20; 30 ft. 9⅝-36 lb. J55—$2.91. In Houston yard. Sharp Oil Corp., Box 707. Phone Justin 6480. Houston, Texas.

FOR SALE: Approximately 15,000 feet of 6" OD "Invasion" Steel Pipe. Wt. about 9#, 6⅝" OD Plain Ends, 20' lengths. New condition. Also, approximately 15,000 feet of 6⅝" OD Plain End Stand Black Steel Pipe, No. 2 Grade. M. KAPLAN & SON, Box 1883, Phone 942, Monroe, Louisiana.

FOR SALE: We are taking up in the Fish Pool south of Wewoka, a large quantity of 2", 3", and 4" line pipe. All should be available within 30 days. Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

WAR SURPLUS MACHINERY
Gaso, Byron Jackson, Aurora, Wayne, Lombard, & Hale Fire Pumps with Engines, 1½ to 25 KW Generator Sets or Light Plants, Engines, Suction Hose, Fire Hose, Victaulic Couplings & Etc. Write for listing. H. A. McCarthy, 310 Thompson Bldg., Phone 5-3296, Tulsa, Oklahoma.

FOR SALE: 3 New 10,000 bbl. A.P.I. Columbian Bolted Steel Tanks. 160—8000 & 10,000 Gal. Tank Cars. Darien Corp., 60 E 42nd St., N. Y., N. Y.

FOR SALE

New and Used 48-L, 36-L, 28-L, 24-L, 22-W and 21-W Bucyrus-Erie Drills.

BEACON SUPPLY CO.
Box 398 Pampa, Texas Phone 3377

Several Army Surplus 4½" x 6" Gaso Duplex 1860 Pumps — two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-86064—Houston, Texas

EQUIPMENT FOR SALE

FOR SALE: Two steel mud tanks, 5 feet by 8 feet; 30 feet long, made of ¼" steel, sloping bottom. Never been used. $3200. Located Makin Drilling Company's yard, Hobbs, New Mexico.

ONE Skid mounted 5 x 10 Gardner Denver Pump with 525 Buda Engine used to drill five shallow holes—$3000.00. Riverside-6811, Dallas, Texas.

FOR SALE: One Star A-83 Speedster in excellent condition. For information, call Carl A. Lesh, Hart, Michigan, or D. B. Lesh Drilling Company, St. Elmo, Illinois.

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES. E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

FOR SALE—Kobe triplex power unit Ser. No. 3200-001, size 2-B-2RG, direct driven, mounted on power base. Flexible engine coupling, booster pump and drive, single chemical feed, chemical tank and drive, engine beds, guards, and miscellaneous piping. ALSO, 1 Kobe triplex power unit Ser. No. 3300-111. Same as above. Both practically new and in good shape. Can be seen on lease west of Okemah, Oklahoma. For information phone 2-8095, Tulsa.

FOR SALE: At our Pampa Gasoline Plant —1-4' O.D. x 40' long, Propane Storage Tank. Code Vessel 200# at 250° F. Price $750.00 new 1940. Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

FOR SALE: 1—Fairbanks Morse — Model BE 24 Diesel Engine 150 H.P. twin cylinder horizontal. 1—Set National Transit Reciprocating hot oil pump size 5¼ x 18 H.D.O.P. for diesel engine drive. 1—Set Worthington simplex steam reciprocating hot oil pumps, size 24 x 5 x 24. All of the above may be inspected on Pana Refining Co. location at Pana, Illinois. All in operating condition.

PACKAGED H_2S REMOVAL UNITS

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GRAFF ENGINEERING & EQ'PT. CO.
3415 Westminster, Dallas 5, Texas

FOR SALE

3—10 x 4¼ x 10 XOB Ingersol-Rand Compressors. Completely repaired with intercoolers. Also 20" Stroke Compressor Cylinders in most sizes, 6¼" to 26".

W. S. SMITH
205 Thompson Bldg. Phone 2-5473
Tulsa, Oklahoma

FOR SALE

100 KW. Generator Set—General Motors Series 71—Twin 6 Motors—with 100 KW. Generator—complete with exciter, voltage regulator, etc. Run 200 hours since complete overhaul. Also Caterpillar D-8800 Power Unit completely rebuilt.

MARTIN TRACTOR CO.
Chanute, Kansas

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

SEISMOGRAPH EQUIPMENT FOR SALE: Two 2-Ton Chevrolet Coleman 4-Wheel Drive water trucks. 500 gallon tank completely winterized, vacuum fill, Tulsa winch, etc. Excellent condition, low mileage. Original Cost $6600.00 — Sale Price $4000.00.

One ½-Ton Chevrolet crew and field service unit. Bed enclosed with steel, cab with heater, 65 gallon gas tank with gear pump, 7:50 x 15 tires. Low mileage. Original Cost $2800.00—Sale Price $1800.00. Riverside-6811, Dallas, Texas.

FOR SALE: One used R6I Climax Power Unit—mounted on skids with clutch & radiator. Combination Propane-Natural gas fuel system. Has operated 2400 hours—complete details with picture on request—for quick sale $1650.00. Cummins Diesel Sales Corp., 1914 Wyandotte, K.C., Mo.

WICHITA (50) Spudder complete with Hercules engine, lines—tools—light plant—reamers—pipe sufficient for 2500 foot well. F. E. Hunt, Adair, Iowa.

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Steel Cone Roof with Structural Roof Supports
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Used, Good Condition. Suitable re-erection.
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FOR SALE

4—250 bbl. 4—500 bbl. low type
4—1,000 bbl. high type 4—1,500 bbl.
3— 5,000 bbl. 5—10,000 bbl.
All NEW closed A.P.I. bolted type steel tanks
4—NEW closed welded steel tanks 7'6" dia. x 13'6" long, ⅝" shell, ¾" bulged heads
3—NEW vertical welded steel tanks with welded stands, 4'8" dia. x 18'8" high, 1½" thickness, bulged heads
16—Used horizontal welded steel tanks 8' dia. x 30' long, ¼" thickness, approx. 12,000 gal.
20—Used vertical welded steel tanks, like glass enameled inside, 10'4" dia. x 17'4" high, ⅜" shell, dished heads
100—Used closed vertical Cypress WOOD tanks, approx. 10' diameter, from 8' to 18' high, complete with round hoops and lugs

We carry large quantities in stock for immediate shipment of New and Guaranteed Used steel PIPE and TUBING up to 30" in diameter.

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2 Stage Atmospheric Vacuum Crude Pipe Still

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Any offer submitted before March 15, 1950 will be considered.

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Mr. E. H. Clendenin
Standard Oil Development Company
P. O. Box 121, Linden, New Jersey
Telephone: Elizabeth 2-3900

EQUIPMENT FOR SALE

FOR SALE: 1—Cardwell K Double Drum Unit unitized with GAK Waukesha. 1—7¼" x 18 Model 7P Wilson-Snyder Pump. 1—7¼ x 12 Clark Triplex Pump. 1—7¼ x 10 Model EE-PXD Gardner-Denver Pump. 1—4 x 6 Fig. 6161-A Fairbanks-Morse Pump. 1—13⅜ x 3 Union Triplex Glycol Pump. 2—D13000 Caterpillar Diesel Engines. 2—PA100 International Engines. 1—7⅝ x 8¾ Hughes Type J Core Barrel. 1—A250 Bethlehem Crown Block. 1—Deckard Monkey Board for 136'-30' Base Derrick. 1—Hunt Tool Monkey Board for 126'-24' Base Derrick. 1—13⅜ SDA Cameron Blowout Preventer c/w 13⅜ Pressure Operated Gate Valve. 1—Set (2) 7'4" wide x 10' high x 21' long Substructure c/w walkways, handrails, and steps. 1—Type B-6 Emsco Swivel. 10—5½" OD x 30' Drill Collars in tandem of 5 each. 3—5" OD x 26' Drill Collars. 1—24" x 48" Link Belt Mud Screen c/w Model AEH Wisconsin Motor.

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MODEL KS Cardwell Single Drum Hoist, SRK Waukesha. No mast. Will accommodate Spudding Attachment. Excellent Condition. Model HL Cardwell Double Drum Drawworks, 140GK Waukesha. Convertible to Spudder. Good Shape. Both running in Kansas and priced right. Box D-400, The Oil and Gas Journal, Tulsa, Oklahoma.

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PHONE: COTTON VALLEY 26

EQUIPMENT WANTED

WANTED: COMPLETE #6 Baker, cable tool, coring barrel. Write condition, location and price: Williams Oil Co., 915 South Main, Ottawa, Kansas.

WANTED: Core drilling Rig with complete outfit drill pipe tools and water Truck. Failing 1500 or equal size. T. R. Davis, 700 Mosley St., Vidalia, Georgia.

WANTED: Late model drilling rig capable of drilling 8500 feet complete with portable derrick, drill pipe, blowout preventer, hydromatic brake, all necessary tools and accessories. Must be in A-1 condition. Cash transaction. Box D-386, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Two Failing 1500′ Core Drills or Failing 44s. West Drilling Company. Athens, Texas.

WANTED: CABLE TOOL Star bits, 15½, 20, and 24". State full length, length and width of body, size square and pin, whether spiral or straight. Cushman & Pilcher, Rangely, Colorado.

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HELP WANTED

HIGH type, responsible executive wanted as Manager Latin-American operations for substantial independent producing company entering foreign operations. Applicant should be college graduate, under 40 years of age; have minimum 15 years' experience in production and drilling work, particularly in high pressure oil and gas well completions. Applicant should speak Spanish fluently, have thorough experience in development Geology, be equipped to prepare and maintain adequate reservoir and engineering studies including repressuring and pressure maintenance. Excellent compensation. When replying, give full details. Our present employes not considered for this position. Box D-364, The Oil and Gas Journal, Tulsa Oklahoma.

MANUFACTURER'S Representative wanted to sell Oil Field Drilling and Production Equipment in East Texas, North Louisiana, and Arkansas. Give complete information including present lines and references. Box D-398, The Oil and Gas Journal, Tulsa, Oklahoma.

MAN wanted to operate receding head Landis Pipe Threading Machine. Permanent job. Petroleum Pipe & Supply Co., P.O. Box 1168, Corpus Christi, Texas.

GEOLOGIST: Independent producer wants man acquainted Southern Oklahoma, North Texas to watch plays, secure deals. Advise fully experience salary desired. Box D-396, The Oil and Gas Journal, Tulsa, Okla.

FOREIGN and Domestic Oil Employment Directory (including late supplement of oil companies and drilling contractors in Western Canada). Over 500 listings in drilling, production, refinery, natural gasoline, pipelines, geological, exploration, supplies, manufacturers, services and refinery and pipeline contractors, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla. (Our 30th year).

HELP WANTED, SALESMAN: We want a man interested in adding several thousand dollars to his yearly income. He must be well established in the oil country trade in Houston. He should have other supporting lines that would be non-conflicting with electric motors and controls. We prefer a man over thirty, married, and with better than a high school education. If interested, give complete information in first letter. Reply to: Box D-384, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Engineer with experience in core analysis to supervise routine laboratory and research work and interpret routine results. Advanced degree preferred. Salary open. State experience, education, and salary expected. Continental Oil Company, Personnel Division, Ponca City, Oklahoma.

WANTED: Instrument man with experience in oil refinery and chemical plant instruments. Denver location. State age, experience, and salary expected, in first letter. Box D-373, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

EXPERIENCED gravity personnel for foreign work, party chiefs, surveyors, and operators. All expenses. The best opportunity in the industry to make money and advance. Exploration Surveys, Inc., 5615 Daniels Avenue, Dallas 6, Texas.

SALES AGENTS wanted by well established Oil and Gas production equipment manufacturer. Three territories available (1) Illinois, Indiana, Michigan and Ohio, (2) Texas Panhandle and North New Mexico, (3) South Texas. These territories offerred on exclusive contract to capable man on commission basis. Prefer Graduate Mechanical or Petroleum Engineer with five to ten years field or selling experience. Line of equipment includes Oil and Gas Separators, Wellcheckers, Free Water Knockouts, oil, water, and gas meters, Liquid Level Controls, Pressure Regulators, Chemical Pumps, and other items. Reply Box D-376, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: Young man preferably some experience water flooding to supervise small water flood, work out operation and extension plans, assist operation stripper leases, and make deals for independent producer Oklahoma or Central Texas. Experience preferred. State complete experience and salary required. Box D-397, The Oil and Gas Journal, Tulsa, Okla.

SITUATIONS WANTED

19 YEARS experience in natural gasoline plant and cycling operations—15 years in supervisory capacity. I am fully qualified to operate and manage any size or type of gas processing plant. Can furnish good references upon request. Available immediately. C. L. Chewning, General Delivery, Kermit, Texas. Telephone 176-M.

MECHANICAL Designer—machines, tools, products, development work, top hand. Available soon. Write Box D-375, The Oil and Gas Journal, Tulsa, Okla.

GEOPHYSICIST—Bachelors degree geology. Two years graduate study. Seven years seismic experience including two and one-half years as party chief. Three years in South America. Desires position as senior computer or interpreter with oil company, foreign or domestic. Presently employed. Box C-389, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN, 2½ years major company, 30, single, B.A. degree; abstract & title experience, office management; desires position with future based on demonstrated ability. Box D-399, The Oil and Gas Journal, Tulsa, Oklahoma.

DRATSMAN-PILOT desires position with oil or construction company in Southwest. Five years piping and mechanical drafting experience; commercial pilot's license, qualified in popular types private aircraft, also A-26, B-26. Box D-393, The Oil and Gas Journal, Tulsa, Oklahoma.

REGISTERED MECHANICAL ENGINEER: Four years design refinery, gasoline and chemical plants. Former airforce engineering officer desires project or plant engineering. Box D-394, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES: PETROLEUM SPECIALTIES. B. S. Organic Chemistry, patents, five years research, three years sales and market development. Desires position with refinery to develop new industrial markets for solvents, waxes and oils. Box D-395, The Oil and Gas Journal, Tulsa, Oklahoma.

COMPETENT PILOT: Commercial Flight Instructor, Multi-engine, Instrument; 2700 hours, total time accident free. 200,000 transcontinental miles. Experienced A & E mechanic. Richard W. French, 251 E. Newton Place, Tulsa.

PETROLEUM ENGINEER: Age 45, 25 years experience in drilling and production operations. Supervisory experience in completion and workover operations as district engineer, tool pusher and production superintendent. Desire connection with independent operator. Will consider foreign employment. Box D-390, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT-AUDITOR, CPA. Fifteen years diversified accounting and tax experience, principally in Oil Industry. Desires change. Box D-391, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No 131, Ph. No. 131, Hobbs, New Mexico.

LEASE AND DRILLING BLOCKS

SEE A. L. BOWLES, ADA, OKLA., FOR DRILLING DEALS, LEASES, ROYALTIES

FOR SALE: LEASES directly in trend between two producing fields. Laramie County, Wyoming . . . $5.00 per acre. M. B. Garman, 3922 Cribbon Ave., Cheyenne, Wyoming.

FOR SALE: Oil and Gas Leases and drilling propositions in shallow territory of Allen, Simpson, and Warren Counties, Kentucky, W. P. Harley, Bowling Green, Kentucky.

80-ACRE lease in Artesia pool for sale with drilling obligation—shallow. 640 acres in Loving County, Texas—shallow, Delaware, and deeper; between Wheat Pool and Kyle Pool. Large tract in Panhandle in trend 1½ to 3 miles from a pool of ten producing wells. John P. Mathis, P.O. Box 1106, Amarillo, Texas.

WILL sell oil leases in Illinois; also drilling blocks, semi and wildcat. We specialize in Illinois. S. J. Burkitt, Moweaqua, Illinois.

NORTH DAKOTA—LEASES & ROYALTIES Inquiries invited: Curran and Curtis, Box 165, Bismarck, North Dakota.

NORTHWEST COLORADO, Rio Blanco, Moffat, and Routt Counties, **produces 98% of all oil produced in State of Colo.** Served by 3 pipe lines—have 3 structures mapped by 3 Major Oil Co. geologists and U.S.G.S. —Within one to eight miles of pipe lines. 11,000 acres of leases—Will sell one-half interest $5.00 per acre, $55,000.00 cash bonus and you drill 3 wells free—Want someone willing and able to spend **tax money for drilling.** Get facts from your senator, congressman, attorney or accountant—Full commission to brokers furnishing buyer—S. Marvin James, K Bar T Ranch, Meeker, Colorado. Phone Meeker 4.

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Oil and Gas Leases. Drilling Deals also considered. State complete details in letter to be held in strictest confidence. Box D-380, The Oil and Gas Journal, Tulsa, Oklahoma.

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ROYALTIES

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San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

SCURRY COUNTY ROYALTIES
Send for list of choice Scurry County Royalties. Also have royalties under major blocks cheap. Navarro Royalties Company, Odessa, Texas.

MONTANA ROYALTIES
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ROYALTY: ½ of ⅛ good to 1965 on 4 sections on Moore & Hartley County line in Texas. $6.00 per acre. Write A. H. Hesse, Dalhart, Texas.

WE will buy producing or non-producing oil royalties. Standard Security Company, 115 Broadway, New York 6.

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W. T. Waggoner Bldg., Fort Worth, Tex.
Telephone 3-7269

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Full ⅛ royalty interest in producing wells and all right, title and interest in the Twist Farm, approximately 715 acres located in the North Aden Field, Wayne County, Illinois.

Mineral Reservations and Royalty Interests, Approximately 6400 acres—38 separate tracts in southern Illinois. Final liquidation of Illinois Midwest Joint Stock Land Bank of Edwardsville, Illinois. Call or write for information.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418 815-15th Street, N.W., Washington 5, D. C.

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I offer a 10,000 acre combination farm and ranch. Some 2,000 acres under cultivation and also with a carrying capacity of 400 or more cattle. Well improved. 10 miles from city and 4 miles from paved road. For particulars write:

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WANTED

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Producing Royalties wanted in Texas. Also proven or semi-proven leases in West Texas. Would like some in Scurry, Mitchell, Borden, and Kent counties

Box D-370
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

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ONE WELL 30 barrels pumping and flowing by heads 1400 feet . . . Ten undrilled locations . . . 28 feet of producing sand, no water. New equipment electrically operated. 40 Gravity. Cash sale, no trades. P O Box 26, Tulsa, Oklahoma.

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ENGINEERING & CONSTRUCTION: Established engineering group invites inquiry. Additions, reworking, design, surveys, and construction of refinery units, gasoline plants, and pumping stations. Box D-392, The Oil and Gas Journal, Tulsa, Oklahoma.

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Consulting Geologist
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Calgary, Alberta, Canada

ATTENTION!

Well established independent pipe line company desires to install and operate gathering and transportation systems for Texas producers. Please furnish daily production and estimated length of line required.

For further information write:

Box 2166
Corpus Christi, Texas

EQUIPMENT MEN

(Continued from page 240)

ply Co., of Hobbs, as distributor of all Indian products in New Mexico.

Arthur Schwarz Made Vice President by Nooter Corp.

Elmer Nooter, president of the Nooter Corp., of St. Louis, has announced the appointment of Arthur Schwarz to the position of vice president in charge of sales. Schwarz has been connected with the Nooter firm since 1935.

Robert J. Ryan is executive vice president; S. C. Tracy, vice president and treasurer; and H. A. Frith, vice president and superintendent. The Nooter firm fabricates steel and alloy products and does a general line of boiler and steel erection work.

Bridgeport Brass Opens New Dallas Sales Office

Bridgeport Brass Co. has opened a new district sales office at Dallas, to handle the sale of all Bridgeport mill products, plumbing brass goods, copper water tube, and pipe. The new office will be under the direction of the Dallas district manager, B. M. Neilson, who has had considerable experience in the metals and refining fields in the Southwest.

In announcing the new office, Bridgeport's vice president in charge of sales, Austin R. Zender, said, "With our new Dallas office, we can now give customers in Arkansas, Louisiana, and Texas improved service on Bridgeport products."

Operators Report Small Increase in Footage, But Slightly Fewer Completions

by Polly DeArmond

OPERATORS reported a total of 3,102 new wells and 11,636,959 ft. drilled during January 1950. These preliminary figures represent a small decrease in completions, down 2.7 per cent, but a slight increase in footage, up 2.5 per cent, over January 1949. During the corresponding month of the previous year operators finished 3,187 wells with 11,349,694 ft. The ratio of oil or gas successes to number of completions remained about the same with January 1950 edging ahead by approximately 1 per cent.

Active Areas Show Gains

With the exception of California, the main oil-producing areas reported increases in both number of wells and footage in the comparison of January vs. January. The southern states, including Arkansas, Louisiana, Mississippi, Alabama, Georgia, and Florida, gained 38 wells, up 15.8 per cent, and 306,649 ft., up 23.3 per cent. Despite hampering winter weather, the Rocky Mountain region (Colorado, Utah, Wyoming, Montana, and the Dakotas) showed increases of 12 completions (up 15 per cent) and 84,346 ft. (27.2 per cent) over January of last year. The Mid-Continent division, composed of Oklahoma, Kansas, Nebraska, and Missouri, reported gains of 100 wells, or 17.6 per cent, and 309,820 ft., or 15.4 per cent. The Texas-New Mexico section increased 28 completions, up 2.4 per cent, and 71,905 ft., up 1.4 per cent.

Declines from January 1949

Since the middle of 1948 there has been a steady decline in operations in the Appalachian area. This downward trend has continued into 1950, with New York, Pennsylvania, and West Virginia reporting declines of 194 completions, or 49.4 per cent, and 302,219 ft., or 44.4 per cent, from 1949's figures. The Pacific Coast was off 50 wells, down 23.3 per cent, and 29,110 ft., down 3.5 per cent. The Ohio-Indiana-Kentucky-Illinois-Michigan group dropped 19 wells (3.4 per cent) and 154,126 ft. (12.2 per cent).

Seasonal Trend

January is usually lower than an average month in completions, which have ranged from 6.5 to 8.3 per cent of the year's total in the past few years. Thus it can be computed that cumulative completions for a normal year will be more than 12 times the number of wells drilled during the first month. If this holds true for 1950, the forecast of some 37,400 wells by The Oil and Gas Journal in the Annual Review - Forecast issue of January 26, 1950, appears to be in line with completions reported for January.

SUMMARY OF COMPLETIONS, JANAURY, 1950

	Total comp.	Oil	Gas	Dry	Under 2,500 ft.	2,500-5,000 ft.	5,000-7,500 ft.	7,500-10,000 ft.	10,000-12,500 ft.	Over 12,500 ft.	Total footage	Rigs and drilling
New York	40	20	0	20	40	0	0	0	0	0	58,101	63
Pennsylvania	§114	55	§16	43	97	16	1	0	0	0	196,651	224
West Virginia	45	8	26	11	32	12	0	1	0	0	121,370	148
Ohio	76	28	21	27	44	31	1	0	0	0	167,627	129
Indiana	87	33	8	46	71	16	0	0	0	0	158,903	129
Kentucky	78	39	8	31	63	15	0	0	0	0	130,333	62
Illinois	242	116	1	125	146	96	0	0	0	0	524,974	227
Michigan	49	22	0	27	23	25	1	0	0	0	129,596	131
Kansas	285	140	25	120	43	240	2	0	0	0	910,019	290
Neb., Mo., Iowa	6	1	0	5	0	6	0	0	0	0	24,204	10
Oklahoma	377	223	16	138	118	174	64	11	10	0	1,382,614	678
Texas	1,117	744	65	308	277	466	248	108	18	0	4,824,945	1,488
North	193	120	1	72	98	74	21	0	0	0	548,107	198
West Central	121	56	1	64	51	64	6	0	0	0	385,018	115
West	282	232	1	49	47	80	104	43	9	0	1,567,921	653
Panhandle	112	80	29	3	4	108	0	0	0	0	335,483	99
East	91	66	5	20	11	53	16	11	0	0	395,822	82
Gulf Coast	161	110	11	40	17	39	57	42	6	0	971,482	144
Southwest	157	80	17	60	49	48	45	12	3	0	681,112	197
Louisiana	218	142	23	53	58	38	44	32	41	5	1,327,196	244
Northern	114	72	16	26	58	21	23	7	5	0	442,462	84
Southern	104	70	7	27	0	17	21	25	36	5	884,734	160
Arkansas	31	18	0	13	7	19	5	0	0	0	103,112	31
Mississippi	25	11	0	14	1	1	14	4	5	0	181,172	22
Ala., Ga., Fla.	4	2	0	2	0	2	1	0	1	0	11,576	7
Montana	15	6	2	7	10	5	0	0	0	0	30,626	72
Wyoming	63	44	0	19	6	16	35	5	0	1	318,394	128
Colorado	9	2	0	7	6	2	1	0	0	0	26,418	21
Utah	4	1	0	3	1	3	0	0	0	0	12,899	13
New Mexico	51	30	11	10	9	33	3	5	1	0	195,877	103
California	165	121	2	42	36	74	26	16	9	4	792,649	‡125
Dakotas	1	0	0	1	0	0	1	0	0	0	5,700	4
Total January 1950	3,102	†1,806	224	‡1,072	1,088	1,290	447	182	85	10	11,636,959	14,349
Total December 1949	3,315	1,877	254	1,184	1,338	1,264	463	173	67	10	11,755,236	4,607
Total January 1949	3,187	1,804	204	1,189	1,191	1,269	448	186	84	9	11,349,694	4,454

*Incl. 83 service wells: N. Y. 20, Pa. 38, Ohio 4, Kans. 10, Okla. 8, No. Tex. 1, W. Cent. Tex. 1, E. Tex. 1. †Incl. 34 distillate wells: Okla. 2, W. Tex. 2, E. Tex. 4, Tex. Gulf 3, SW. Tex. 2, No. La. 8, So. La. 13. ‡Incl. all wells rigged up and or drilling at end of month. §Incl. 1 Va. at 5,700 ft. ‖Incl. 3 Wash.

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American Recording Chart Co. 226
Ansul Chemical Company 224
A-1 Bit & Tool Company 220
Armco Drainage & Metal Products, Inc. 122
Armstrong Machine Works 93
Athey Products Corporation 177
Automatic Sprinkler Corp. of America 101
Avondale Marine Ways, Inc. 81
Axelson Manufacturing Co. 157

Baash-Ross Tool Company 151
Bakelite Division, Union Carbide & Carbon Corporation 168
Baker Oil Tools, Inc. 108
Beaver Pipe Tools, Inc. 225
Bethlehem Steel Co. 50
Bingham Pump Co. 40
Bonney Forge & Tool Works 200
Bowser, Inc. 176
Boyd Co., Clarence L. 199
Brewster Company, Inc., The 21
Briggs Bituminous Composition Co. 201
Brown Fintube Co., The 42
Brown Instrument Division, Minneapolis-Honeywell Regulator Co. 74, 75
Bucyrus-Erie Co. 63
Burgess-Manning Company 10
Butler Manufacturing Company 149
Byron Jackson Co. Front Cover

Cable & Stine 225
Cameron Iron Works Inside Back Cover
Cardwell Mfg. Co., The 186, 187
Carnegie-Illinois Steel Corporation 85
Caterpillar Tractor Co. 12, 13
Cessna Aircraft Company 71
Chicago & Southern Air Lines 161
Chicago Bridge & Iron Company 121
Chicago Metal Hose Corp. 62
Christensen Diamond Products Co. 166
Clark Bros. Co., Inc. 189
Classified Advertising 241, 242, 243, 244
Construction Machinery Co's. 227
Continental Electric Co., Inc. 196
Continental Supply Co., The 82, 83
Cooper, Inc., Fred E. 159
Core Laboratories, Inc. 15
Crose Manufacturing Co., Inc., M. J. 202, 205
Curtin & Co., Inc., W. H. 176
Cutler-Hammer, Inc. 14

Darling Valve & Mfg. Co. 51
Davis Regulator Co. 211
Dean Brothers Pumps, Inc. 194
De Laval Steam Turbine Company 20
Diamond Alkali Company 31
Dowell Incorporated 106
Dresser Industries, Inc. 160, 206
Dresser Manufacturing Division 206
Drilling & Service, Inc. 221
Drilling Specialties Company 218
Emerol Manufacturing Co., Inc. 211
Empire Trust Company 165
Emsco Derrick & Equipment Co. 90
Enardo Manufacturing Co. 196
Ensign Carburetor Company 16
Equitable Equipment Co., Inc. 192
Erie Bolt & Nut Co. 166

Fairbanks, Morse & Co. 2
Fisher Governor Co. 6
Ford Motor Co., Industrial Engine Dept. 26, 27
Foster Wheeler Corp. 17, 18
Four Wheel Drive Auto Co., The 32
Fuller Company 156
Gaso Pump & Burner Mfg. Co. 55
Gates Rubber Co., The 36
General American Transportation Corporation 132
General Electric Company 84
GMC Truck & Coach Division, General Motors Corp. 8
Goodyear Tire & Rubber Co., Inc. 9
Gott Mfg. Co., H. P. 192
Grancell, I. H. 214
Graver Tank & Mfg. Co., Inc. 52
Green Pipe & Supply Co. 231
Griscom-Russell Co., The 94, 95
Grove Regulator Co. 61
Gunite Concrete & Construction Co. 209
Haering & Co., Inc., D. W. 185
Happy Company, The 147
Harvey & Co., Ltd., G. A. 34

Helicoid Gage Division, American Chain & Cable Company, Inc. 98
Hewitt-Robins Incorporated, Hewitt Rubber Division 215
Hilliard Corporation, The 223
Hinderliter Tool Co., Div. H. K. Porter Company, Inc. 213
Homestead Valve Manufacturing Co. 39
Huber Corporation, J. M. 230
Huey & Co., S. E. 201
Hughes Tool Company Back Cover
Independent Exploration Co. 49
International Harvester Co. 143

Johns-Manville Corporation 233
Jones & Laughlin Supply Co. 69
Kaiser Steel Corporation 78
Kelley Company, Ben F. 233
Kobe, Incorporated 160
Koch Engineering Company, Inc., The 172
Landis Machine Company 7
Lane-Wells Company 89
Langham, Langston & Burnett 171
Layne & Bowler, Inc. 30
Le Grand Sutcliff & Gell, Ltd. 92
Leland Equipment Company 232
Levingston Shipbuilding Co. 184
Leyman Manufacturing Corp. 205
Lufkin Foundry & Machine Co. 144
Lunkenheimer Co., The 28

Manning, Maxwell & Moore, Inc. 43
Manzel Division of Frontier Industries, Inc. 179
Mark & Company, Clayton 204
Marsh Instrument Company 66
Mason-Neilan Regulator Company 184
Master Tank & Welding 198
McCord Corporation 201
McGregor Working Barrel Company 225
Mercoid Corp., The 215
Metal & Thermit Corp. 202
Metal Goods Corporation 56
Midwest Piping & Supply Company, Inc., The 153
Mission Mfg. Co. 155
Moore Corporation, Lee C. 148
Morse Chain Company 102, 103
Mountain Iron & Supply Company 202
Murphy Diesel Company 5
National Airoil Burner Co., The 209
National Supply Co., The 76
National Transit Pump & Machine Co. 64
National Tube Company 53
Nicholson & Co., W. H. 209
Nordstrom Valve Division, Rockwell Manufacturing Co. 97
Norris Brothers, Inc. 194
Oakite Products, Inc. 188
Ohio Injector Co., The 44
Oil and Gas Journal, The 228
Oil Center Tool Co. 88
Oil Well Manufacturing Corp. 167
Oil Well Supply Co. 79
Orbit Valve Company 128
Otis Pressure Control, Inc. 229

Pacific Pumps, Inc. 72
Paris Distributor, Inc., Henry H. 194
Parkersburg Machine Company 201
Parkersburg Rig & Reel Co. 70
Penberthy Injector Co. 191
Perrault Brothers 198
Petro-Chem Development Co., Inc. 152
Petroleum Electric Power Association 77
Petroleum Rectifying Company 45
Pipe Fabrication Institute, The 208
Pittsburgh Corning Corporation 35
Pittsburgh Equitable Meter Co. 48
Pittsburgh Lectrodryer Corp. 60
Pittsburgh Steel Company 68
Porter Company, Inc., H. K., Quimby Pump Division 104
Powell Co., The Wm. 4
Quijada Tool Company, Inc. 205
Ratigan, J. P. 193
Reed Roller Bit Company 181, 182
Republic Steel Corporation 25
Robbins & Myers, Inc. 178
Rogers Galvanizing Co. 125
Ross-Martin Co. 214
Ruska Instrument Corporation 196
Rust-Oleum Corporation 99
S & R Tool & Supply Co. 171
Scott Aviation Corp. 233
Sheffield Steel Corporation 207
Southern Forge, Ltd. 222
Southern Mill & Mfg. Co. 173
Southwestern Porcelain Steel Corp. 223
Spencer Chemical Company 179
Standard Oil Co. of California 100
Standard Pressed Steel Co. 176
Standco Brake Lining Co. 214

Thompson-Hayward Chemical Co. 228
Thornhill-Craver Co. 80
Timken Roller Bearing Company, Steel & Tube Division 29
Tretolite Company 67
Twin Disc Clutch Co. 38

Union Carbide & Carbon Corporation, Bakelite Division 168
Union Wire Rope Corporation 86, 87
U. S. Steel Corp. Subsidiaries 53, 79, 85
Unit Rig & Equipment Co. Inside Front Cover
Universal Oil Products Co. 174, 175

Victaulic Co. of America 210
Vogt Machine Co., Henry 65

Wagner Electric Corporation 54
Wales Trucking Co. 201
Walworth Co. 1
Waukesha Motor Company 41
Well Equipment Mfg. Corp. 190
Westinghouse Electric Corp. 22, 23
Wheatland Tube Company 33
Wheland Company, The 47
Williams Company, W. Horace 171
Williamson, Inc., T. D. 203
Willys-Overland Motors 57
Wilson Foundry & Machine Co. 96
Wilson Manufacturing Co., Inc. 216
Wilson Oil Tools, Inc., Web 212
Wisconsin Motor Corporation 161
W-K-M Company 37
Wood's Sons Co., T. B. 214
Worthington Pump & Machinery Corp. 58, 59
Worth Steel Company 73
Wright Chemical Corporation 211
Wyatt Metal & Boiler Works 24

CALENDAR

February

Western Petroleum Refiners Association, regional technical meeting, Washington-Youree Hotel, Shreveport, February 24.

American Institute of Chemical Engineers, regional meeting, Houston, February 26-March 1.

American Society for Testing Materials, spring meeting, Hotel William Penn, Pittsburgh, February 27-March 3.

March

American Petroleum Institute, Division of Production, Southwestern District meeting, Adolphus Hotel, Dallas, March 8-10.

Texas Independent Producers and Royalty Owners Association, fourth annual meeting, Baker Hotel, Dallas, March 9.

Indiana Independent Petroleum Association, spring convention, Hotel Severin, Indianapolis, March 9-10.

American Chemical Society, Houston meeting, Shamrock Hotel, Houston, March 26-30.

North Texas Oil and Gas Association, Kemp Hotel, Wichita Falls, March 25.

Southern Gas Association, Galveston, Tex., March 27-29.

Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, March 27-29.

American Petroleum Institute, Division of Production, Mid-Continent district meeting, Skirvin Hotel, Oklahoma City, March 29-31.

April

American Petroleum Institute, board of directors meeting, Houston, April 3-4.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

TABLE OF CONTENTS ON PAGE 107

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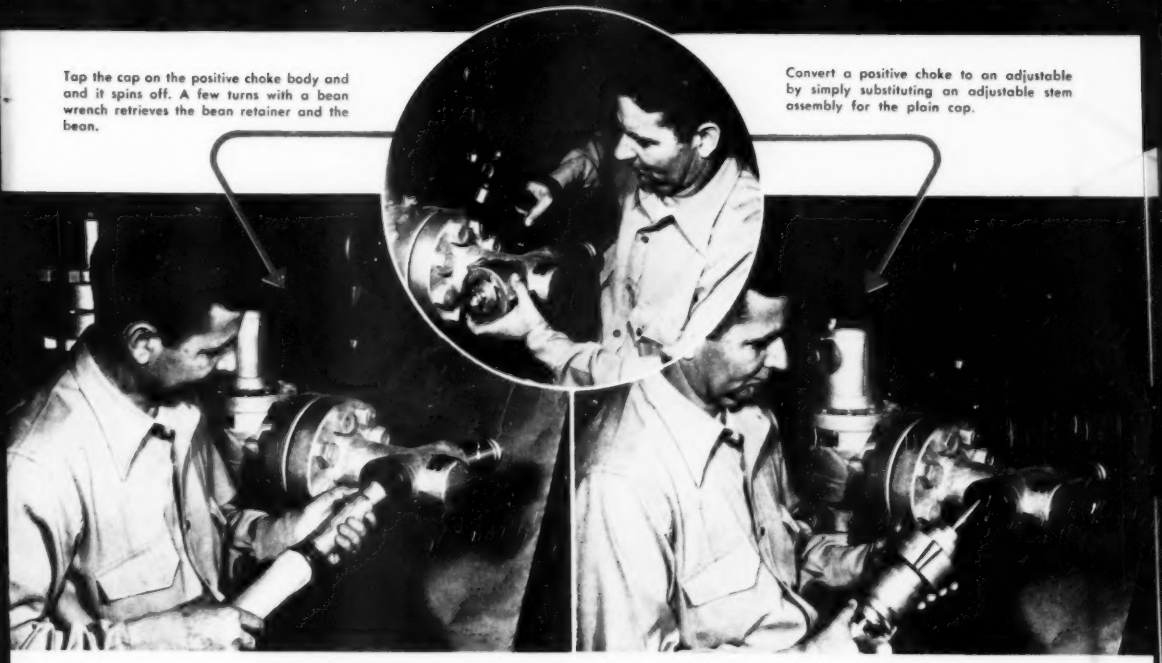
CAMERON PRODUCTION CHOKES

Tap the cap on the positive choke body and and it spins off. A few turns with a bean wrench retrieves the bean retainer and the bean.

Convert a positive choke to an adjustable by simply substituting an adjustable stem assembly for the plain cap.



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COMBINATION POSITIVE-ADJUSTABLE CHOKE

ADJUSTABLE CHOKE

The new **CAMERON** Type "H" Production Choke.. feature completely interchangeable components which provide maximum flexibility of choice in arranging flow control assemblies. The plain positive choke can be converted to an adjustable choke or to a combination positive-adjustable unit by merely interchanging a few parts. Flow beans used are standard and interchangeable in all other **CAMERON** Chokes and Flow Wings.

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